

# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York.

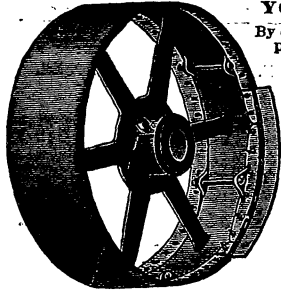
Vol. LI. No. 11.

New York, Thursday, March 16, 1893.

\$4.50 a Year, including Postage.  
 Single Copies, Ten Cents.

Reading Matter Contents.....page 650  
 Classified List of Advertisers.... " 120  
 Alphabetical Index to Advertisers " 124  
 Advertising and Subscription Rates " 123

**SAVE YOUR POWER,  
 YOUR BELTS,  
 YOUR MONEY**

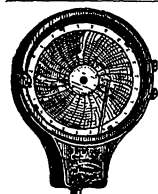


By covering your pulleys with  
**SHULTZ Patent Leather Pulley Covering**  
 Send for Circular I to  
**SHULTZ BELTING CO.,**

ST. LOUIS, MO.  
 NEW YORK, N. Y., 225 Pearl St., A. B. Laurence, Mgr.  
 BOSTON, MASS., 164 Summer St., G. J. Kelley, Mgr.  
 PHILADELPHIA, PA., 129 N. 3d St., J. Garnett, Mgr.

**BELLEVILLE STEEL CO.,**

**CUT ST. LOUIS. NAILS.**  
 MANUFACTURERS,  
 Soft Steel Merchant Bars.  
 Steel Channels and Angles.  
 Steel T Rails, 8 to 45 lbs.



Every Steam Plant  
 Should be provided with  
**BRISTOL'S RECORDING  
 PRESSURE GAUGE.**  
 Low in Price and Guaranteed.  
 Send for circulars and fac-simile  
 chart.  
**THE BRISTOL'S MFG. CO.,**  
 Waterbury, Conn.

**SAMSON CORDAGE WORKS,**  
 Manufacturers  
**BRAIDED CORD**

—FOR—  
 Sash Cord, Bell Cord, Clothes Lines, Masons' Lines.  
 Send for Samples.  
**Boston, Mass.**

**THE WILLIAMS PRINTING CO.,**  
 Commercial Printers and Binders

CATALOGUES A SPECIALTY.

96-102 READE STREET, NEW YORK

**TURNBUCKLES.**



BRANCH OFFICE: **Cleveland**  
 36 Liberty St., City Forge and Iron Co.,  
 NEW YORK. **CLEVELAND, O.**



**RAILS**  
**CUT TO LENGTHS** for Contractors',  
 Builders' and Mill use. **NEW** Steel Rails of  
 all sections; **SECOND-HAND** for relaying;  
**OLD** for scrap use. Also all kinds of railroad  
 scrap.

WHEN BUYING WRITE TO US FOR PRICES.  
**J. H. RICHARDSON & CO.,**  
 708 Penn Ave., Pittsburgh, Pa.

## HIGH GRADE SHELLS.

Especially Adapted for Nitro Powders.

**"SMOKELESS."**

Are the best for shooting moderate charges  
 of Nitro Powders.

SALMON



COLOR.

**PRIMED WITH U. M. C. No. 3 STRONG PRIMER.**

To obtain the best results with Nitro Powders, you should not load your shells  
 with a heavier charge than 3 3/4 drs. (by measure) for 10 ga., 3 1/2 drs. for 12 ga., and  
 2 1/2 drs. for 16 ga.

—MANUFACTURED BY—

**The Union Metallic Cartridge Co.,**  
**BRIDGEPORT, CONN.**

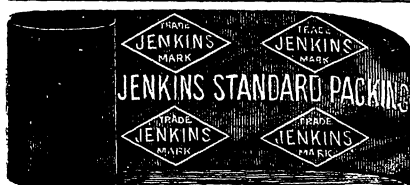
## RANDOLPH & CLOWES,

WATERBURY, CONN.

Branch Depots: 131 Worth St., New York; 71 West Washington St., Chicago, Ill.;  
 369 Atlantic Avenue, Boston, Mass.

## SEAMLESS DRAWN BRASS AND COPPER TUBING.

Hot and Cold Rolled Sheet Copper and Brass of all kinds.



### INCREASED SALES

Show that our customers appreciate the value  
 of improvements made in

### JENKINS PACKING.

It can be used again and again. Does not **SEAL**  
 or **BLIND** out. Have you tried it recently? If  
 not, DO SO! Look for "Trade-Mark."

**JENKINS BROS.,**

New York, Philadelphia, Boston and Chicago.

**DRIPPING PANS.** 40 Sizes. The best made. (Beaman's Patent Improved.)

**MARYLAND ROASTER AND BAKER.** } New and Effective.  
 } Cheapest in the Market

Made only by **MATTHAI, INGRAM & CO.**

Factory and Main Office: BALTIMORE, MD.

Branch: 64 Reade St., N. Y.

Leading manufacturers of Stamped and Patent Pieced Tin Ware and Galvanized  
 Iron Ware.

## THE Avery Stamping Co.

CLEVELAND, O.

Heavy Blanking, Pressing & Stamping.

**Rainey Connellsville  
 Furnace and Foundry Coke.**

The only Coke you can buy and know you are getting the best that can be manufactured. All our works are  
 the heart of the Region, within four miles of Connellsville, Pa.

CAPACITY. 3,000 TONS DAILY.

**W. J. RAINEY,**

MAIN OFFICE:

Mercantile Bank Building.

**CLEVELAND, O.**

THE  
**ANSONIA BRASS**  
AND **COPPER CO.**  
MANUFACTURERS OF  
**BRASS AND COPPER**  
Seamless Tubes, Sheets, Rods and Wire.

**Ingot Copper.**

SOLE MANUFACTURERS

**Tobin Bronze**

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round,  
Square and Hexagon Bars, for Pump  
Piston Rods and Bolt Forgings.

13 & 21 Cliff Street, - New York.

**JOHN DAVOL & SONS,**

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

INGOT COPPER, SPELTER, LEAD, TIN,  
ANTIMONY, SOLDER & OLD METALS,

100 John Street, - New York.

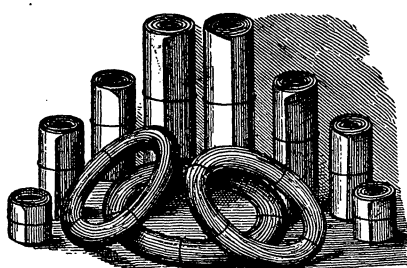
**Rome Brass and Copper Mills,**

ROME, N. Y.,

— MANUFACTURERS OF —

Roll and Sheet Brass and German Silver.  
Brass, Copper and German Silver Wire.  
Brass and Copper Rods and Braised Brass Tubing.  
Rivets and Burs.  
Seamless Brass Ferrules.  
Check and Key Tags.  
Brazers and Sheathing Copper.  
Copper Bottoms.  
Bolts, Circles, &c., &c.

The Phosphates of America. Where and how they occur; how they are mined; and what they cost. With practical treatises on the manufacture of sulphuric acid, acid phosphate, phosphoric acid and concentrated superphosphates, and select methods of chemical analysis. By FRANCIS WYATT, Ph.D. Cloth, profusely illustrated..\$4.00  
For sale by David Williams, 96-102 Reade St., N. Y.



**Waterbury Brass Co.**

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and German Silver Wire, Brass and Copper Tubing,

COPPER RIVETS AND BURS,

PERCUSSION CAPS,

TAPE MEASURES,

METALLIC EYELETS,

Brass Kettles, Brass Tags, Powder Flasks, Shot Pouches, &c.,

AND SMALL BRASS WARES OF EVERY DESCRIPTION.

HICK'S PRIMERS. BERDAN PRIMERS.

*Cartridge Metal in Sheets or Shells a Specialty.*

Sole Agents for the CAPEWELL MFG. CO.'S  
Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Providence, R. I.

MILLS AT WATERBURY, CONN.

THE

**New Haven Copper Co.,**

SOLE MAKERS OF

**POLISHED COPPER**

Under Patent of T. James, Sept. 12, 1876.

ALSO MANUFACTURERS AND

DEALERS IN

**BRAZIERS' & SHEATHING COPPER,**

Kettles, Bottoms, Bolts, Circles, &c.,

ALSO MANUFACTURERS OF

Cast Steel Angers and Bits of Superior Quality.

294 Pearl St., NEW YORK.

**MATTHIESSEN & HEGELER ZINC CO.,**

LA SALLE, ILLINOIS,

**SMLTERS OF SPELTER,**

AND MANUFACTURERS OF

**SHEET ZINC AND SULPHURIC ACID.**

Special Sizes of Zinc cut to order. Rolled Battery Plates.

Selected Plates for Etchers' and Lithographers' use.

Selected Sheets for Paper and Card Makers' use.

Stove and Washboard Blanks.

**ZINCS FOR LECLANCHE BATTERY.**

**BRASS GOODS MFG. CO.,**

Mfrs. of Stamped Brass, Silver and Nickeled Goods, Brass Labels for Cans and Rubber Moulds,

**BRONZE DOOR KNOBS,**

Bronze and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

**HENDRICKS BROTHERS,**

Proprietors of the

**Belleville Copper Rolling Mills,**

Manufacturers of

**Braziers', Bolt and Sheathing**

**COPPER.**

**COPPER WIRE AND RIVETS.**

Importers and Dealers in

Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.  
49 CLIFF ST., NEW YORK.

**THE PLUME & ATWOOD MFG. CO.**

MANUFACTURERS OF

**Sheet and Roll Brass**

—AND—

**WIRE,**

GERMAN SILVER AND GILDING METAL,  
COPPER RIVETS AND BURRS, COPPER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain,  
Kerosene Burners, Lamp Trimmings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL,  
THOMASTON, CONN.

FACTORIES:  
WATERBURY, CONN.

**Holmes, Booth & Haydens**

MANUFACTURERS OF

Sheet, Roll Brass, Brass and  
German Silver Wire.

COPPER RIVETS AND BURRS,  
**JACK CHAIN.**

SEAMLESS TUBING, BRASS AND COPPER.

Braided Brass and Copper Tubing,  
Bare and Insulated Wire for Electric  
Lighting and Street Rail-  
way Use, Lamp Goods and  
Kerosene Burners in  
great variety.

FACTORIES: 25 Park Place,  
Waterbury, Conn. New York.

**SCOVILL MFG. COMPANY,**

Manufacturers of

**BRASS**

Sheet, Wire, Tubes.

**BUTT HINGES,  
BUTTONS,  
LAMP GOODS,  
NOVELTIES.**

**PURE ALUMINUM**

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

428 Broome Street, New York.  
210 Lake Street, Chicago.  
29 High Street, Boston.

**WILLIAM S. FEARING.**

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

Sheet Brass, Fancy Sheet Brass,  
German Silver, Copper, Brass  
and German Silver Wire,  
Braided and Seamless Brass and  
Copper Tubes, Brass and Cop-  
per Rods, Brass Ferrules,  
Pure Copper Wire,  
Sheet and Ingot Copper, Spelter,  
Tin, Antimony, Lead, &c.

**WM. MCFARLAND,**  
IRON FOUNDER,

TRENTON, - - N. J

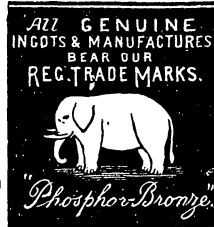
**Chilled Cast Wire DIES**

A SPECIALTY.

Any Size or Style Made at Short Notice.



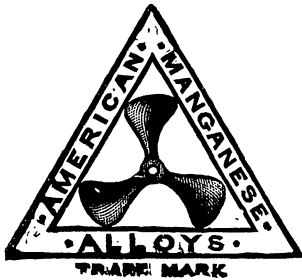
**ELEPHANT  
TRADE-MARK.**



**PHOSPHOR-BRONZE**  
INGOTS, CASTINGS, WIRE, SHEET & C.  
**THE PHOSPHOR BRONZE SMELTING CO. LIMITED**  
512 ARCH ST. PHILADELPHIA PA. U.S.A.  
**ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.**

**PHOSPHOR  
BRONZE.**

**The Wm. Cramp & Sons S. & E. B. Co., PHILADELPHIA, PENNA.**  
**BRASS FOUNDERS.**



YORK AND THOMPSON STS.,  
SOLE MANUFACTURERS OF  
**AMERICAN MANGANESE BRONZE.**

**MANGANESE BRONZE PROPELLER WHEELS A SPECIALTY.**

Our Manganese Bronze is invaluable where Castings of great Tensile Strength are needed. In this quality it is nearer Steel than any other alloy in the market, and in appearance the castings are unequalled.

*We Make Larger Castings and More of Them than Any Competitor.*

**WALDO & STOUT, BRIDGEPORT, CONN.**

SOUND CASTINGS IN

**ALUMINUM, PHOSPHOR AND MANGANESE BRONZE.**

WIRE BARS and PLATES FOR ROLLING MILLS

**BRASS, BRONZE,  
COMPOSITION and  
ALUMINUM**

**CASTINGS, Heavy and Light.**

**F. L. GAYLORD CO.**

ANSONIA,  
CONN.

Send  
for  
Prices.

**GENUINE  
PHOSPHOR TIN,**  
MANUFACTURED BY THE  
**CROSBY STEAM GAUGE  
AND VALVE CO.**  
Boston, Mass., U. S. A.  
Branches: NEW YORK, CHICAGO AND LONDON.

**PASSAIC ART CASTING CO.**  
PASSAIC, N.J.  
New York Office: 33 WARDEN ST.  
Fine Castings by new pressure process, equal to hand cut work, in Bronze, Brass, Aluminum and German Silver. Machinery Name Plates 1 1/2 cents per sq. in. Aluminum Bronze Dies, Metal Molds and Mechanical Castings absolutely true to pattern.

**THE CRESCENT TRY IT!**  
AND YOU WILL USE NO OTHER  
**THE CRESCENT BRAND  
PHOSPHOR  
TIN.**  
THE HIGHEST AND  
RICHEST GRADE MADE.  
MANUFACTURED ONLY BY  
**THE CRESCENT PHOSPHORIZED METAL CO.**  
OFFICE AND WORKS  
2107 2109 and 2111 INDIANA AV. PHILADELPHIA, PA.

**CROWN SMELTING COMPANY,**  
Chester, Pa.  
**Bronze, Brass and Composition Castings.**

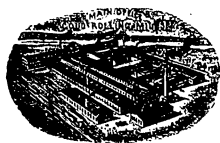
Inventors and Sole Manufacturers of

**"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."**

Manufacturers of **PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.**

Specifications in ingot metal or castings.

**THE WILMOT & HOBBS MFG. COMPANY**

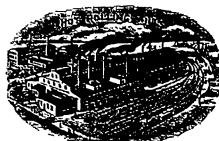


Especially solicit orders for "Soft" and "Extra Soft" Plain Blue Finish or Annealed or Pickled

**HOT ROLLED BAND, STRIP  
AND PLATE STEEL.**

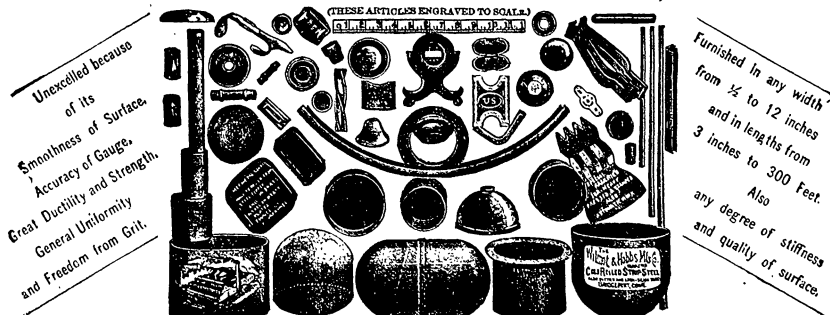
Great accuracy of gauge and width and uniformity of quality will always be maintained.

Also THE CELEBRATED BRIGHT SURFACE and ANNEALED



**COLD ROLLED SHEET AND STRIP STEEL**

FOR DIFFICULT PRESSED, STAMPED, DRAWN WORK, &c.



Unexcelled because  
of its  
Smoothness of Surface,  
Accuracy of Gauge,  
Great Ductility and Strength,  
General Uniformity  
and Freedom from Grit.

Furnished in any width  
from 1/8 to 12 inches  
and in length from  
3 inches to 300 feet.  
Also  
any degree of stiffness  
and quality of surface.

The above illustrates something of the variety of Stamped and Drawn Work which can be made from this Steel.

**PRICES GREATLY REDUCED** On some Grades and Sizes of C. R. Steel when Bought in Large Quantities of a Size.

When in a hurry use Long Distance Telephone.  
2 1/2 hours' ride from Grand Central Depot, N. Y. City, via N. Y., N. H. & H. N. R.

**BRIDGEPORT, CONN.**

**PHOSPHOR-TIN**

BY USING MY PHOSPHOR TIN MANUFACTURERS CAN MAKE ANY DESIRED GRADE PHOSPHOR BRONZE THEMSELVES. BY THE SIMPLE PROCESS OF MELTING. MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET. NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICE ADDRESS **HALK & NAUMANN** NEW-YORK  
SOLE AGENTS FOR THE U.S. AND CANADA 3 PEARL

**ALUMINUM!**

**THE COWLES ELECTRIC SMELTING &  
ALUMINUM COMPANY,**  
Lockport, - New York,

Offer Pure Aluminum in Ingots, Slabs, Sheet, Wire and Castings at lowest market rates.

**Aluminum Bronze, Aluminum Brass,  
Silver Bronze, Silicon Bronze  
and Manganese Bronze.**

# WASHBURN & MOEN MFG. CO.

Works: Worcester, Mass., and Waukegan, Ill.

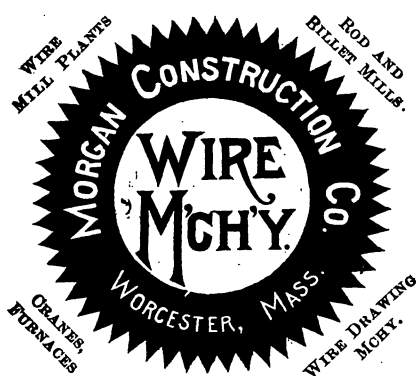
Copper  
Insulated  
Glidden Barbed  
Waukegan Barbed

# WIRE

Rods  
Springs  
Bale Ties  
Rope and Cable.

Makers of Iron, Steel and Copper.

Warehouses: New York, 161 Cliff St.; Chicago, 107 & 109 Lake St.; San Francisco, 8 & 10 Pine St.; Houston, Texas.



## The American Metal Co.

(LIMITED),

Levin Building, 80 Wall St., New York.  
P. O. BOX 957.

COPPER, COPPER ORES AND MATTES.

TIN, LEAD, SELLER, ANTIMONY, NICKEL, ALUMI-  
NUM, BULLION, IRON.

Advances made on Consignments

AGENTS FOR

Henry R. Merton & Co., - - London.  
Heraillgesellschaft, Frankfurt-on-Main.  
Williams Foster, & Co., Ltd. Swansea.

## AMERICAN SPIRAL SPRING CO.

MANUFACTURERS OF

ALL KINDS OF SPIRAL SPRINGS.

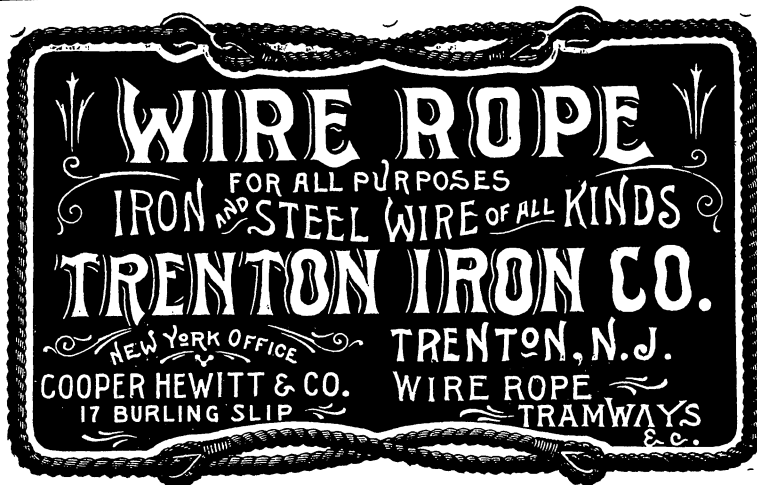
OFFICE AND WORKS: -

Shingles and Bluff Streets, - PITTSBURGH, PA.  
P. O. Box 104. TELEPHONE 705.



## Steel and Iron.

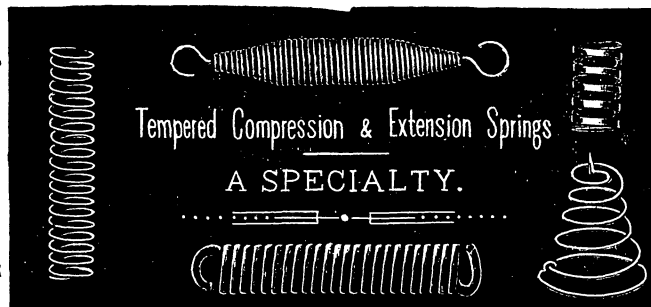
Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the rolling mill, the forge and the foundry. By W. H. GREENWOOD. \$2.00. Sent, postpaid, on receipt of price, by DAVID WILLIAMS, Bookseller and Publisher 96-102 Reade Street, New York.



MILLER & VAN WINKLE.  
MANUFACTURERS OF

STEEL WIRE AND STEEL SPRINGS.

TEMPERED STEEL WIRE.



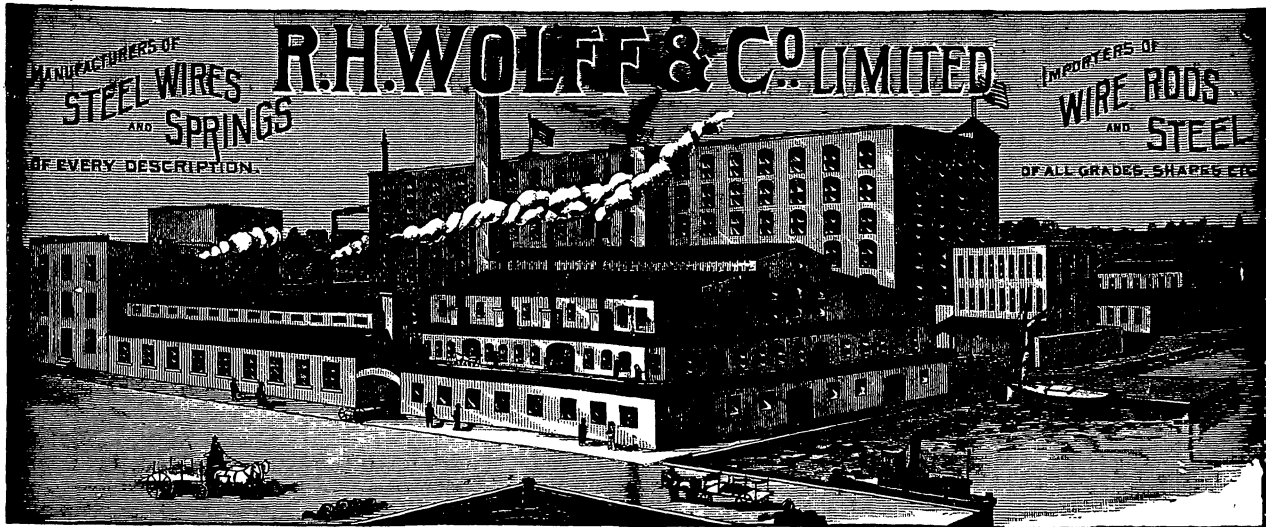
MACHINERY SPRINGS.

OFFICE AND WORKS: } BROOKLYN, N. Y.  
18 to 24 Bridge Street,

VOLUTE,  
WIRE  
and  
FLAT STEEL

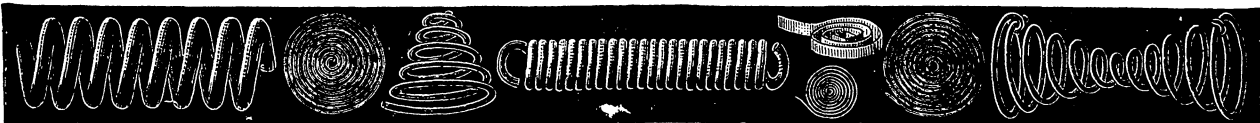
# SPRINGS

for Agricultural Implements, Machin-  
ery and various other purposes.  
Write for prices to  
**SABIN MACHINE CO.,**  
MANUFACTURERS.  
MONTPELIER, VT.



117th to 118th Street and Harlem River.

General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

## STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Lock, Hat, Brush, Saw, Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c. Piano, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Bralded and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Slit soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

ESTABLISHED 1880.

LUTHER SHAW &amp; SON,

CHAS. L. SHAW, Proprietor.

BRASS FOUNDERS

[AND MANUFACTURERS OF]

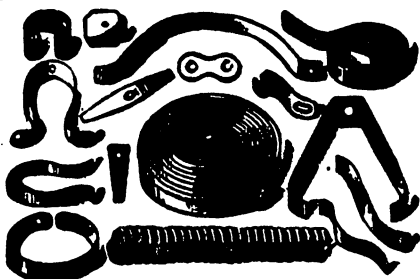
### BABBITT \* METAL

and SOLDER.

All kinds of Brass, Composition and Bronze Castings made to order.

Correspondence Solicited.

WORCESTER, MASS.



DUNBAR BROS.,

Manufacturers of

Clock Springs and Small Springs

of every description, from best Cast Steel,

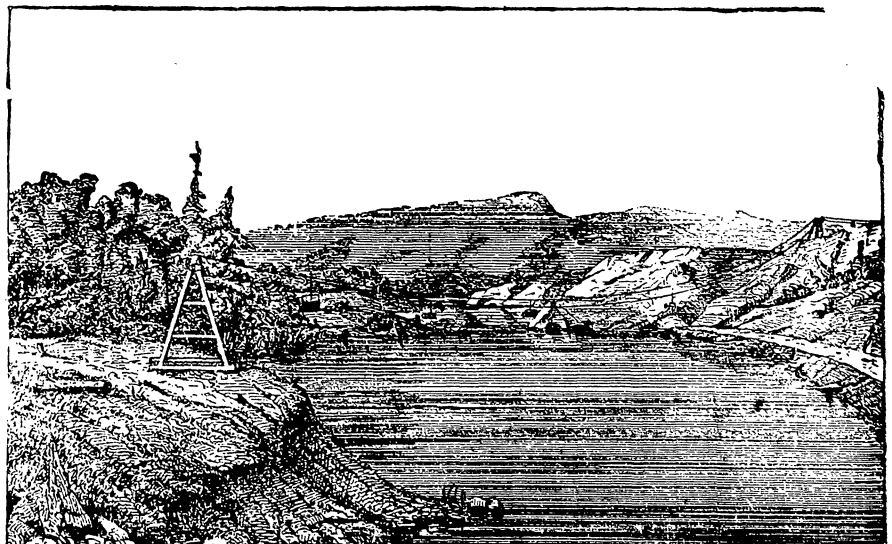
BRISTOL, CONN.

**ELECTRICITY AND MAGNETISM.** A short text-book, with 165 explanatory engravings and diagrams. 240 pages, 12mo. By T. DUNMAN. 40 Cents. Sent, prepaid, on receipt of price, by DAVID WILLIAMS, Publisher and Bookseller, 98-102 Reade Street, New York

## CALIFORNIA WIRE WORKS,

9 FREMONT STREET.

SAN FRANCISCO, CAL.



MANUFACTURERS OF

WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.  
HALLIDIE'S PATENT WIRE ROPEWAY,

Simplest and most economical means of transportation.

Send for illustrated Catalogue.

THE CELEBRATED

# "SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST.

**Always  
Ask  
For**

**"POWER"  
ROPE.**

Unequaled for Strength  
and Durability.

Made Only by

Broderick & Bascom Rope Co.,  
St. Louis, Mo.

**HOWSON  
AND  
HOWSON**

**Counsellors at Law  
Solicitors of Patents**

**PHILADELPHIA**  
Forrest Building, 119 S. 4th St.  
**NEW YORK**  
Potter Building, 38 Park Row.  
**WASHINGTON**  
Atlantic Building, 928 F St.

**PATENTS**

U. S. and Foreign Secured.

Trade Marks and Copy Rights. Twenty Years' Experience. Send model or sketch and brief description of your invention for Free report as to patentability. Expert searches and opinions as to Scope, Validity and Infringement. Patent Causes Prosecuted and Defended. Practice in U. S. Supreme, Circuit and Circuit Appeals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents." Free.

**PATENT PRACTICE EXCLUSIVELY.**

References Furnished on Application.

**E. B. STOCKING, Attorney at Law,**  
611 F ST., N. W., WASHINGTON, D. C.

**PATENTS**

**\$40,000,000**

Earned by Bell Telephone Patent in 1891. Protect your invention by PATENT. No charge for examination to determine patentability. Send model and description. New Book FREE.  
**S. C. FITZGERALD, Washington, D. C.**

**H. E. PAINE.**  
Ex Com'r of Patents.

**S. B. LADD,**  
Mechanical Engineer.

**PAINE & LADD,  
PATENT LAWYERS  
AND SOLICITORS.**

Loan and Trust Bldg., Washington, D. C.  
Examinations and Reports on the Validity, Scope and Infringement of Patents. Practice in the U. S. Circuit, Circuit Appeals and Supreme Courts. U. S. and Foreign Patents.

**PATENTS.**

**PATENTS** obtained in all countries. All business relating to Patents prosecuted with care and diligence. As Examiner and Solicitor, twenty-five years' familiarity with **STOVES AND FURNACES, DRIERS, VENTILATORS** and kindred subjects.

**J. A. ASHLEY,**

00 Ninth St. Washington, D. C.

**PATENTS.**

**H. W. T. JENNER, Patent Attorney and Mechanical Expert.** 519 Seventh St., Washington, D. C. Charges moderate. Write for terms  
Established 1833.

**A. LESCHEN & SONS' ROPE CO.,**  
MANUFACTURERS OF

Trade-Mark

**HERCULES**  
WIRE ROPE.

Registered.

**ST. LOUIS, MO. CORRESPONDENCE INVITED.**

**WIRE ROPE**

**Williamsport Wire Rope Co., Williamsport. Pa.**

**WIRE ROPE**  
**HAZARD MFG CO.**

**WAREHOUSES: 87 Liberty St., New York. WORKS Wilkesbarre, Pa.**

**NEW HAVEN WIRE MFG. CO.,**

Manufacturers of

**WIRE**

in great variety.

**NEW HAVEN,**

**CONN.**

**Springs.**



**Springs.**

**Haley Manufacturing Co., Concord, N. H.**

**CLOCK SPRINGS,  
BAND SAW STEEL,  
STEEL WIRE,**

Round, Flat, Tempered and ready for Tempering, Curtain, Needle, Spring Scale, Sash Balance and Lock Wire. Flat Coiled Springs for Lamps, Sleeping Cars, Toy Movements and all other purposes.

**CORRESPONDENCE SOLICITED.**

**WEST'S MOULDERS' TEXT BOOK**

**BEING PART II. OF AMERICAN FOUNDRY PRACTICE,**

Giving the best methods and rules for obtaining good castings, with detailed description for making moulds. A thoroughly practical book that should be in the hands of every moulder.

**PRICE, - Cloth, - 460 Pages, - \$2.50.**

Sent, post-paid, on receipt of price, by


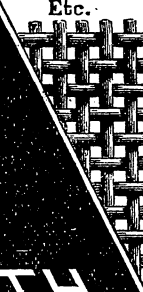
**DAVID WILLIAMS, Publisher and Bookseller,**

**96-102 Reade Street,**

**New York City.**

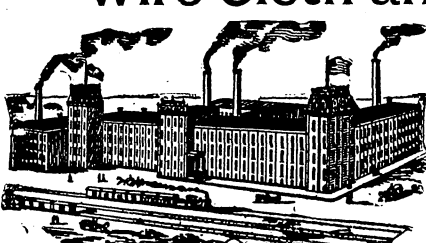
**HOWARD & MORSE**  
45 FULTON ST.,  
NEW YORK.  
HEAVY MINING  
COPPER,  
BRASS,  
STEEL  
OR IRON  
WIRE CLOTH.

ALSO  
MANUFACTURERS OF  
GENERAL  
WIRE WORK.  
Window Guards,  
Stable Fixtures,  
RAILINGS,  
Sand Screens  
Coal Screens  
Etc.

**Art Metal Works**  
WIRE, BRASS and WROUGHT IRON.  
BANK AND OFFICE  
RAILINGS  
In Great Variety and of Handsome Designs.  
ELEVATOR ENCLOSURES.  
Iron and Wire Fences, Coal and  
Ore Screens, Wire Cloth and Wire  
Rope, Brass and Copper Sheets and Tubing, Plain and  
Barbed Fencing Wire. Send for Catalogue and name this Paper.

**WICKWIRE BROTHERS,** CORTLAND, N. Y.  
MANUFACTURERS OF  
Wire Cloth and Wire Goods,  
NEW PROCESS  
Cortland  
POWER LOOM  
WIRE CLOTH.  
Every roll wrapped in Pink Paper  
and has our name on label.



Coal Sieves,  
Flour Sieves,  
Corn Poppers,  
Dish Covers,  
Metallic  
Coal Sieves.

**KILMER MFG. CO.,**  
NEWBURGH, N. Y.,  
MANUFACTURERS OF  
STEEL WIRE RODS,  
BALE TIES, BARB WIRE.  
BEST QUALITY  
Fence Wire Staples, Galvanized Wire Ornamental  
Fencing,  
Cable Wire, Grape Wire, Hop Yard  
Wire, Coiled Steel Wire,  
Fence Wire, &c.





Our New Empire Bale Tie.  
BRANCH HOUSE: 543-545 State Street, Chicago, Ill.  
Address all export communications to  
J. W. D. MEIGHAN, 111 Water Street, New York City.

**H. W. JOHNS' ASBESTOS**  
PAINTS, COLORS, ETC.  
H. W. JOHNS' LIQUID PAINTS | LIQUID COACH COLORS  
ROOF AND RAILWAY PAINTS | COLORS IN OIL  
FIRE-PROOF PAINTS | SHINGLE AND WOOD STAINING  
ROOFING AND BUILDING MATERIALS  
ASBESTOS ROOFING | ASBESTOS BUILDING FELT  
ROOF COATINGS & CEMENTS | ASBESTOS WIRE-CLOTH  
ASBESTOS FIRE AND WATER-PROOF SHEATHING  
FIRE-PROOF CONSTRUCTION MATERIALS  
STEAM P.P.E. AND BOILER COVERINGS  
ASBESTOS AIR CHAMBER COVERINGS  
ASBESTOS SECTIONAL PIPE COVERINGS  
ASBESTOS FELT, LOCOMOTIVE LAGGING, ETC.  
ASBESTO-SPONGE FELT, FILLING, ETC.  
ASBESTO-SPONGE CEMENT FELTING  
STEAM PACKINGS  
ASBESTOS ROPE PACKING | VULCANIZED ROPE PACKING  
ASBESTOS WICK PACKING | ASBESTOS & RUBBER CLOTH  
ASBESTOS SHEET PACKING | TAPE, GASKETS, ETC.  
ASBESTOS FABRICS, ETC.  
ASBESTOS CLOTHS, FOR THEATRE CURTAINS, ETC.  
FIRE-PROOF ROPE, FOR FIRE-ESCAPES, ETC.  
FIRE-PROOF CORD, TWINE RUGS, MATS, SCREENS, ETC.  
FIRE-PROOF COATINGS, CEMENTS, ETC.  
ASBESTOS FURNACE CEMENT | PLASTIC STOVE LINING  
ASBESTOS RETORT CEMENT | CONCRETE COATING, ETC.  
VULCABESTON  
ELECTRICAL INSULATING SHEETS, RINGS, WASHERS, ETC.  
MOULDED GASKETS, UNION WASHERS, PACKING RINGS  
PUMP VALVES, ACCUMULATOR CELLS, STEAM PACKING, ETC.  
ELECTRICAL CONSTRUCTION MATERIALS  
Samples and Descriptive Price List Free by Mail.  
H. W. JOHNS MANUFACTURING CO.  
87 MAIDEN LANE, NEW YORK  
JERSEY CITY. CHICAGO. PHILADELPHIA.  
BOSTON. ATLANTA. LONDON

**James A. Miller & Bro.,**  
129 and 131 South Clinton St.,  
CHICAGO,  
MANUFACTURERS,



FOR  
**ROOFING AND SIDING.**  
Send for Circular and Prices.

**THE IRON FOUNDER.**  
A COMPREHENSIVE TREATISE ON  
The Art of Molding.

INCLUDING CHAPTERS ON  
Core-making; Loam, Dry Sand and  
Green Sand Molding; also Crystalliza-  
tion, Shrinkage and Contraction of Cast  
Iron, and a full explanation of the science  
of Pressures in Molds; added to which  
are Formulas for Mixtures of Iron, Tables,  
Rules and Miscellaneous Information.

BY  
**SIMPSON BOLLAND,**  
Practical Molder and Manager  
of Foundries.

Illustrated with Over Three Hundred Engravings.  
12mo. Cloth, \$2.50

Sent, postpaid, on receipt of price by

DAVID WILLIAMS,

PUBLISHER AND BOOKSELLER

96-102 Reade Street, New York.



## IS IT A HOT BOX AGAIN?

Our Gold Leaf Babbitt Metal is especially adapted for use with high speed and heavy machinery and shafting; in fact, in every place where a Babbitt Metal is required. It is sold under the highest guarantee, and has made a remarkable record with all who have used it. A trial of this metal will demonstrate the truthfulness of our claim. Order a sample lot. 50 lb. in Box, 25c. per lb.

DAY METAL CO., ST. LOUIS, MO.

## CHAMPION IRON COMPANY.



The largest Iron Fence and Railing Works in the U. S.  
KENTON, OHIO.

## W. S. ESTEY,

No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

## WIRE CLOTH

—AND—

## WIRE WORK

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.  
For Bank, Office and Counter Railing, Store Fronts, Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T Sand Screens.

SEND FOR CATALOGUE.

## OXFORD

IRON AND NAIL CO.,  
Cut Nails

AND  
SPIKES.

J. S. SCRANTON, Sales Agent,

81, 83 and 85 Washington Street,

NEW YORK.

## BARBED

## WIRE.

INDIANA WIRE FENCE CO.,

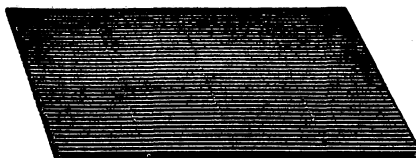
Crawfordsville, Ind.

Pocket Companion. Containing useful information and tables appertaining to the use of wrought iron and steel as manufactured by Carnegie, Phipps & Co., Ltd., Pittsburgh, Pa. For engineers, architects and builders. 1892 edition. Edited by C. L. STROBEL, C.E., assisted by F. H. KINDL, C.E. Leather with flap, 334 pages..... \$2.00

For Sale by DAVID WILLIAMS, 96-102 Reade St. N.Y.

## ARE YOU FAMILIAR WITH

Built  
for  
Service.



The Elastic  
Steel  
Door Mat?

REVERSIBLE.

SELF-CLEANING.

HANDSOME.

THE WIRE GOODS COMPANY, - Worcester, Mass.



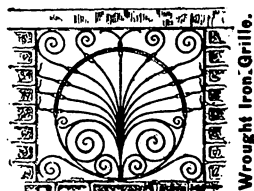
Oat Manger.

## STABLE GOODS.

—CATALOGUE FREE—

Wire and Iron Fencing, Roof Cresting, Weather Vanes, Window Guards, Office and Counter Railing, Netting, Columns, Iron Stairs, Grilles, BUILDERS' WIRE and IRON WORK.

E. T. BARNUM,  
Detroit, Mich.



Wrought Iron Grille.

## THE VAN DORN IRON WORKS CO., Cleveland, Ohio.



Office and Salesroom, 157 1/2 Euclid Ave.,

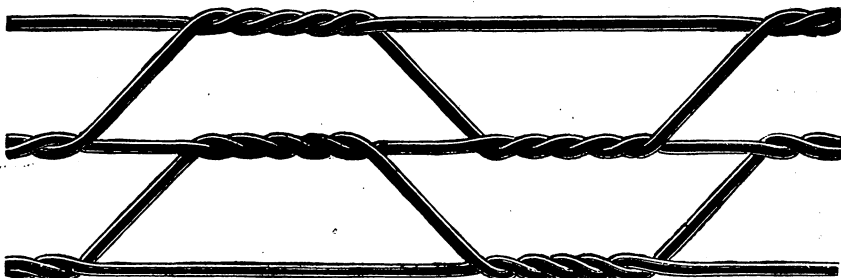
MANUFACTURERS OF

WROUGHT IRON FENCE and RAILING.

Stable Fixtures, Crestings, Terminals, Wire Office and Counter Railing, Lawn Seats and Vases.

Iron and Steel Jail Cell Work. Ornamental and Structural Ironwork.

## STEEL WIRE FENCE BOARD.



## STRONGEST AND CHEAPEST BARBLESS FARM FENCING.

Write for Circular of above, and Steel Web Picket Fence.

DEKALB FENCE CO., - - DeKalb, Ill

AGENCIES: Eastern—HICKS & DICKEY, Philadelphia, Pa. Southern—W. R. BELKNAP & CO. Louisville, Ky. Western—WYETH HARDWARE & MFG. CO., St. Joseph, Mo. Indiana and Michigan—INDIANA WIRE FENCE CO., Crawfordsville, Ind. Texas—G. K. MERIWETHER, Dallas

## Wire Cloth AND Wire Goods

Hardware Grade and Fanning Mill Wire Cloth, Poultry Netting, Heavy Window Screen Wire Cloth, Coal and Sand Screens, Riddles, Ash Sieves, &c., &c.



Office and Counter Railings, Elevator Enclosures, Wire Stair Guards, Hay Racks, Feed Boxes, Window Guards, &c., &c.

BUFFALO, N. Y.



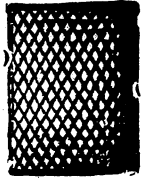


## Reliance Wire Works Co., Milwaukee, Wis.

ARCHITECTURAL WIRE AND IRON WORKERS.

Wire Cloth, Galvanized Fencing and Netting, Wire Lath, Wire and Iron Fences and Railings, Window Guards, Stable Fixtures, Bank and Office Railings, all kinds of Brass, Wire and Iron Work for Buildings and Offices.

SEND FOR ILLUSTRATED CATALOGUE.



# CLINTON WIRE CLOTH CO.,

Manufacturers of Every Description of

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

**Perforated Metals.** GALVANIZERS AND TINNERS OF **Wire Cloth and Nettings.**

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street

## The Gilbert & Bennett Mfg. Co.

—MANUFACTURE—

Pearl Window Screen Wire Cloth.  
Galvanized Steel Wire Cloth.  
Galvanized Wire Poultry Netting.  
"Cottage" Lawn & Garden Fencing.  
The World's Web Wire Fencing.  
Sieves, Riddles, Screens.  
Gilbert's Rival Ash Sifters.  
House Furnishing Wire Goods.

**WIRE CLOTH, NETTING,**  
Fencing, Gates, Fencing Tools,  
**Wire Goods, Wire Work**

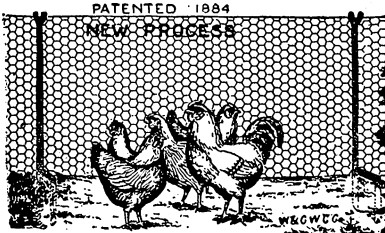
RAILINGS, WINDOW GUARDS.  
WIRE LATHING WITH HAMMOND'S METAL FURRING.

42 and 44 Cliff Street,  
**NEW YORK.**

148 Lake Street,  
**CHICAGO.**

Factories, { GEORGETOWN, CONN.  
CHICAGO, ILLINOIS.  
ESTABLISHED 1818.

## WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mass.



HARD STEEL WIRE

NEW PROCESS

MANUFACTURERS OF EVERY DESCRIPTION OF

**HARD STEEL WIRE CLOTH AND NETTING**

GALVANIZED

**WIRE NETTING.**

Painted Window Screen Wire Cloth,

Patented March, 1884.

Patents Pending.

WIRE LATHING, HOUSE FURNISHING WIRE GOODS

SEND FOR LATEST CATALOGUE.

## Pennsylvania Wire Works,

233 and 235 ARCH ST., PHILADELPHIA.

**EDWARD DARBY & SONS,**

MANUFACTURERS OF

Brass. Copper, Steel or Iron

**WIRE CLOTH,**

Hex. Nettings, Wire Lath and Fencing.

Foundry Riddles, Casting Brushes, Sand and Coal Screens, Shovels, Wrought Iron  
Railing for Banks, Offices, Residences; Ornamental Brass Work,  
Wire Work and Wire Window Guards.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH.

MANUFACTURERS

**THE ROEBLING  
STANDARD  
WIRE  
LATHING.**

**• NEW JERSEY •  
WIRE CLOTH CO.**

**"JERSEY"  
POULTRY  
NETTING  
AND FARM  
FENCING.**

TRENTON,  
NEW JERSEY.

117 AND 119 LIBERTY STREET,  
NEW YORK.

171 AND 173 LAKE STREET,  
CHICAGO.

25 AND 27 FREMONT STREET,  
SAN FRANCISCO.

# STEEL, IRON, COPPER, ZINC, BRASS AND TIN PERFORATED.

—FOR—  
 Grain Cleaning  
 Machinery;  
 Woolen, Cotton, Paper  
 Pulp, Rice,  
 Flour and Oil Mills;  
 Distilleries, Sugar  
 and Malt Houses;  
 Gas, Water, Brick and  
 Tile Works, Filters,  
 Ventilators, &c;  
 Oil, Gas and Vapor  
 Stoves, Lanterns,  
 Lamps, etc.

Perforated Filter  
 Press Plates  
 For Paraffine Wax, Cotton-  
 Seed Oil, Sugar and  
 other purposes.



**THE HARRINGTON & KING PERF. CO.,**  
 Main Office & Works, 224 to 240 Union Street,  
 Eastern office, No 284 Pearl St., New York. **CHICAGO, ILL., U. S. A.**

Screen Plates for  
 Coal, Coke, and  
 Ore Separators, Jigs,  
 Trommels, Washers  
 and Sizers.

Heavy Steel and Iron Plates  
 and Cylinders for Coal and  
 Coke Breakers, Ore, Stone,  
 Phosphates & Gravel Screens.

For Railroads, Loco-  
 motive and Car  
 Builders.

Prices and Samples on  
 Application.

ALUMINUM or MANGA-  
 NESE BRONZE  
**SCREEN PLATES**  
 TO WITHSTAND ACTION OF  
 ACIDULATED WATERS  
 WITH  
 Hardness and Life of  
 Best Steel.

## PERFECTION BRONZE CASTINGS, BABBITT'S METALS, Wire and Wire Cloth OF EVERY DESCRIPTION.

**EASTWOOD WIRE MFG. CO.**  
 Belleville, New Jersey, U. S. A.

## A Complete Treatise ON THE **ELECTRO-DEPOSITION OF METALS.**

Comprising Electro-Plating and Galvanoplastic Operations, the Deposition of Metals by the Contact and Immersion Processes, the Coloring of Metals, the Methods of Grinding and Polishing, as well as Descriptions of the Electric Elements, Dynamo-Electric Machines, Thermo-piles, and of the Materials and Processes Used in every Department of the Art.

TRANSLATED FROM THE GERMAN OF

**DR. GEORGE LANGBEIN.**

With Additions by **WILLIAM T BRANNT.**

**ILLUSTRATED BY ONE HUNDRED AND TWENTY-FIVE ENGRAVINGS.**


In one Volume, 8vo. 404 Pages. Price, \$4.00.

Any book published sent, postpaid, on receipt of price by

**DAVID WILLIAMS,** Publisher and Bookseller, 96-102 Reade St., N. Y.

# CONSOLIDATED STEEL AND WIRE CO.

GENERAL OFFICES, THE ROOKERY, CHICAGO, ILL.

Branch  Offices. { ST. LOUIS, MO., 1935 Papin Street.  
PITTSBURGH, PA., Westinghouse Building.  
NEW YORK CITY, N. Y., Havemeyer Building.  
SAN FRANCISCO, CAL., 81 Crocker Building.

## BARBED WIRE.

WIRE RODS and PLAIN WIRE of Every Description.

## WIRE NAILS.

Bale Ties, Fence Staples, etc.

MILLS LOCATED AT

ST. LOUIS, MO. PITTSBURGH, PA. ALLENTOWN, PA.  
JOLIET, ILL. LOCKPORT, ILL.

**FOUNDERS**  
IN BRASS AND COM-  
POSITION, HEAVY  
AND LIGHT CAST-  
INGS.

**P. P. EMORY MFG. CO.**

— ESTABLISHED 1850. —

SPRINGFIELD, MASS.

Good Work, Fair Prices.

CORRESPONDENCE SOLICITED.

**COPPERSMITHS,**

and Manufacturers of

COPPER AIR CHAMBERS,

EXPANSION PIPES

AND COILS.

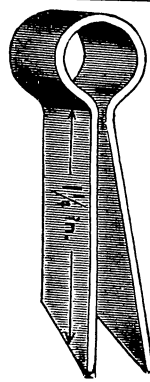


**E. JENCKES MFG. CO.,**

PAWTUCKET, R. I.

Bright Wire Goods,  
Spring Cotters and Keys,  
Crescent Wire Coat  
and Hat Hooks.

Belt Hooks, &c. Bent Wire Work  
A Specialty.

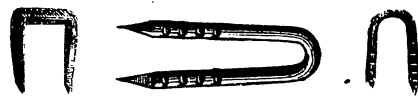


**E. H. TITCHENER & CO.**

(Late Bing. Wire Goods Co.)

BINGHAMTON, N. Y., U. S. A.

— MANUFACTURERS OF —



STAPLES in All Varieties,

Double-Pointed Tacks, Etc.

Blind Staples a Specialty.

**TAUNTON WIRE NAIL CO.,**

Manufacturers of

WIRE TACK and NAIL SPECIALTIES,  
TAUNTON - MASS.

DUPLICATING SAMPLES A SPECIALTY.

Established 1830.

**THE PLYMOUTH MILLS.**

Rivets, Trunk Nails,  
Tacks, Clout Nails,  
Burr, Wire Nails.  
PLYMOUTH, MASS.

HAVE BEEN IMITATED BUT NEVER EQUALED—THEY ARE BEYOND COMPARISON

We make  
90 per cent.  
Of the  
Wire Mats  
Sold in  
America.



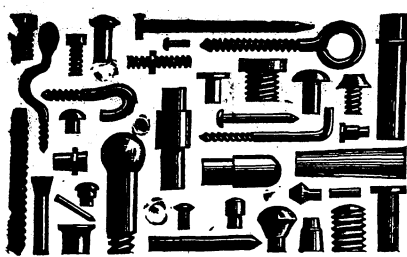
Why?  
Because  
They are  
Odorless,  
Everlasting  
and "Best."

See that your mat has brass tag attached stamped "HARTMAN."

**HARTMAN MFG. COMPANY, Works, BEAVER FALLS, Pa.**

Branches: 102 Chambers St., New York; 73 S. Forsyth St., Atlanta. T. D. GANSE, Gen'l Western  
Sales Agent, 608 State St., Chicago, Ill.

Write for our Testimonial Booklet and Illustrated Catalogue—Mailed Free.

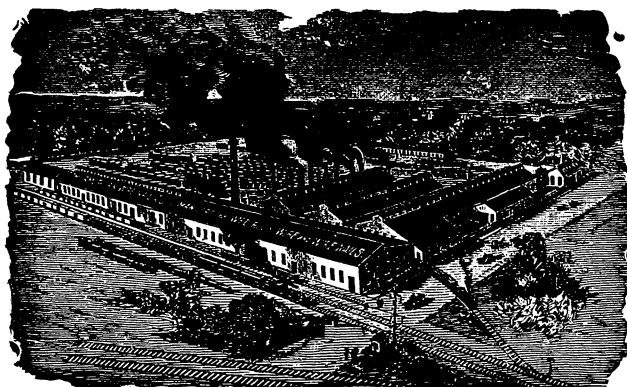


# IRON AND BRASS RIVETS,

STUDS, PINS, SCREWS, &c.,

*For Manufacturers of Light Hardware.*

**BLAKE & JOHNSON, WATERBURY, CONN.**



**The American Wire Nail Co.,**

**ANDERSON, IND.**

STEEL  
ROD  
GALVANIZED  
PLAIN  
FENCE  
ALL KINDS  
WIRE NAILS.

# WIRE

OLIVER WADE, Agt., 18 Broadway, New York.

## NEW CASTLE WIRE NAIL CO.,

MANUFACTURERS OF



### WIRE RODS AND WIRE.

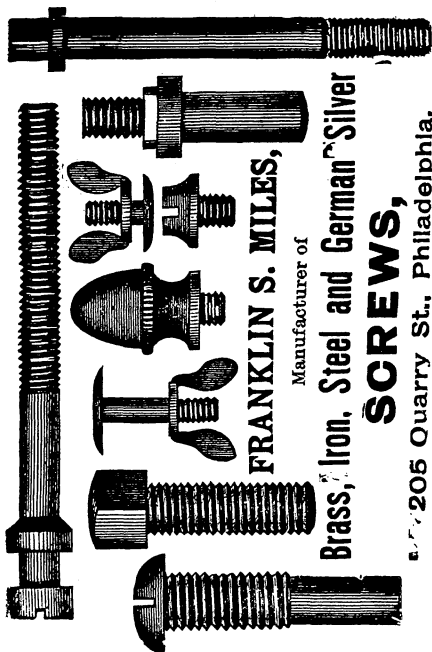
Office and Works,

**NEW CASTLE, PA.**

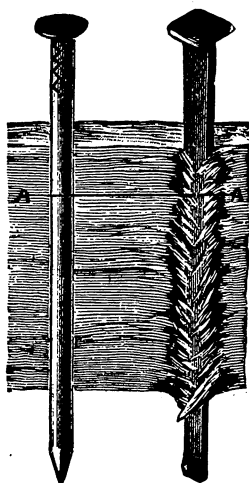
**E. PHILLIPS & SONS**  
SOUTH HANOVER, MASS.

## TACKS

**F. R. EMMONS & BRO**  
21 WARREN ST., NEW YORK.



**FRANKLIN S. MILES,**  
Manufacturer of  
**Brass, Iron, Steel and German Silver**  
**SCREWS,**  
205 Quarry St., Philadelphia.



**THE SALEM WIRE NAIL CO.**

MANUFACTURERS

## WIRE NAILS,

Works: SALEM, O.; FINDLAY, O.

General Office: - SALEM, OHIO.

BRANCH OFFICES:

54 Warren St., New York. | 415 Phenix Bldg., Chicago.

200 Amer. Bld'g, St. Louis. | 207 Neave Bldg., Cincinnati.

19-20 Ainsworth Block, Portland, Ore.

## THE BAACKES WIRE NAIL COMPANY.

CLEVELAND, O.

Steel Wire Nails, Standards Only.

Wire Rods.

Plain Wire,

Galvanized Wire.

Barbed Wire,

Fence Staples.



**Voltic Electricity.** By T. J. Treglohan. 40 cents. For sale by  
**DAVID WILLIAMS,** Publisher  
and Bookseller, 96-102 Reade St., New York.

# American Screw Company,

PROVIDENCE, R. I.

## Cold Forged Products.

### "Spur Pointed" Wood Screw.

Patented May 10, July 19, 1887; Oct. 29, 1889; Aug. 19, Oct. 21, 1890; April 7, May 12, 1891.

#### ITS ADVANTAGES ARE:

Stronger than a cut screw.

Forged nick.

Requires the use of only one bit.

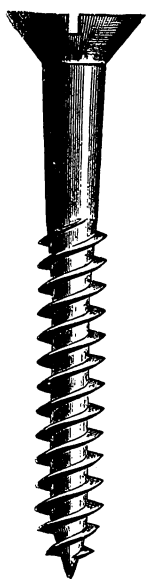
Inserted easier.

Increased holding power.

Centralized point.

Is cold forged, and entire surface has a metallic skin.

Samples Sent on Application.



Patented Nov. 11, 1890, Oct. 20, 1891.



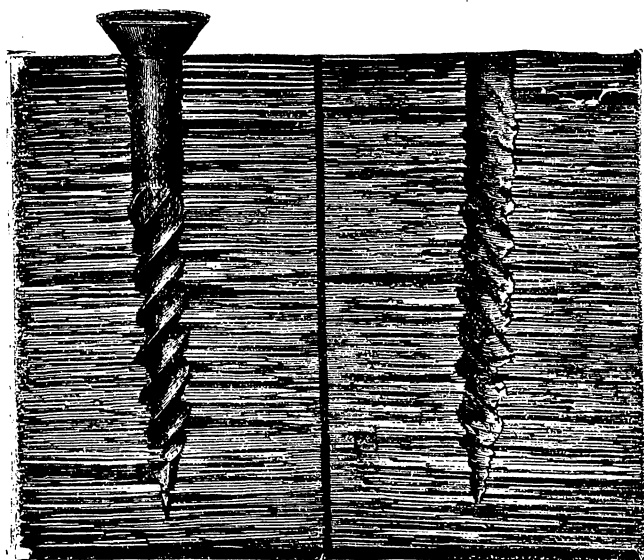
## FLUTED TIRE BOLTS.

SEND FOR SAMPLES.

### "ROGERS' DRIVE SCREWS."

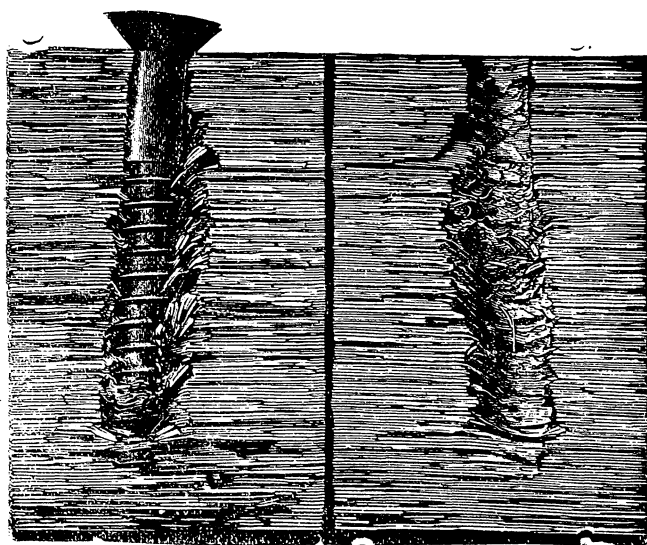
Patented May 10, 1887; July 19, 1887; July 10, 1888. Other patents pending.

List prices, same as common iron wood screws. Discount for Flat Heads, 82½%.



THE "ROGERS DRIVE SCREW,"

Driven with a hammer its entire length.



A COMMON CUT THREAD SCREW,

As ordinarily inserted, i. e., driven two-thirds of its length with a hammer and the balance with a screw-driver. Fibres of the wood are necessarily broken, and holding power of screw much impaired.

**Should be driven with a hammer its entire length.**

1. Turns like a screw when driven with a hammer.
2. Holds stronger than a common screw as ordinarily inserted.
3. Does not break the fibres of the wood.
4. Cheaper than a common screw.
5. Is cold forged and has metallic skin over entire surface.

## AMERICAN SCREW CO.,

PROVIDENCE, R. I.

Chicago Store, No. 19 Lake St.

EUROPEAN AGENTS, THOMAS & STIRLING, Liverpool.



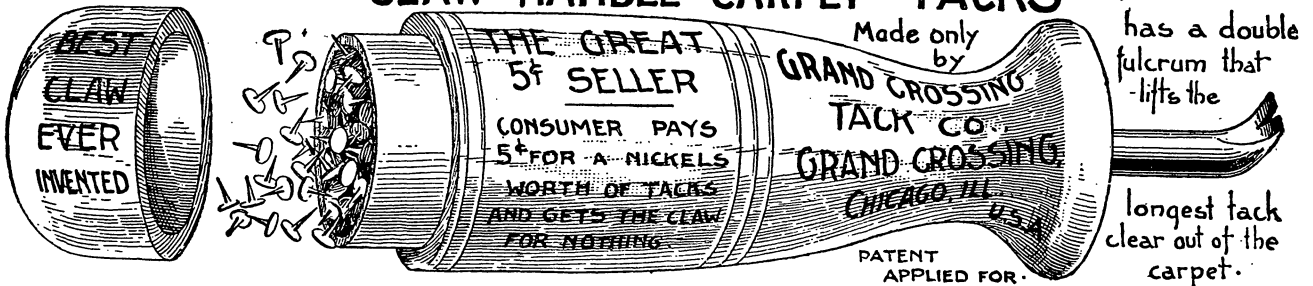
TRUNK,  
CLOUT,  
FINISHING,  
HOOP,  
BARREL,  
3d FINE,

# NAILS

Quality guaranteed. Prices quoted on application.

THE NATIONAL SCREW & TACK CO., - CLEVELAND, OHIO.

## FULL SIZE CUT OF CLAW HANDLE CARPET TACKS -



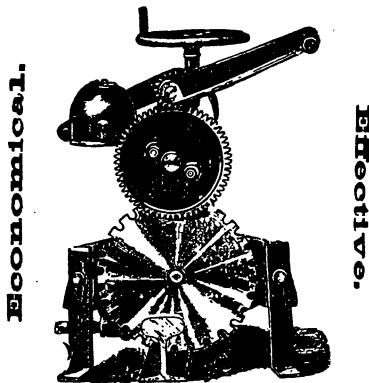
### WE ALSO MANUFACTURE

Tacks, Small Nails, Wire Nails, Wire Brads, Staples, Lining and Saddle Nails, Roofing and Slating Nails, Gilt Nails (Parisian Brand), Cut Tacks in little kegs (Bonnie Blue Brand), Bill Nye Brad Boxes, Wood Kegs, Carpet Tacks, and the

### GREAT 5c. SELLER.

### THE BRYANT METAL SAWING MACHINE.

Portable and Power,  
For STREET and STEAM RAILWAYS.



Iron, Bridge, Shafting and  
General Work.

SATISFACTION GUARANTEED.

**Q & C CO.,**

705-707 Phenix Building, - Chicago.

### COBB & DREW, PLYMOUTH, MASS.

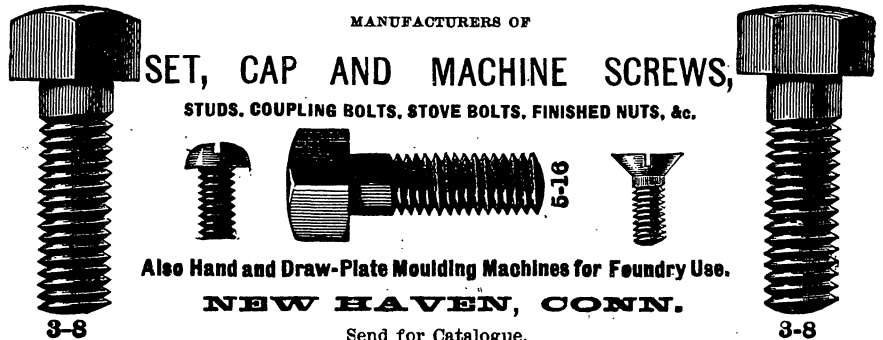
Manufacturers of Norway Iron Rivets, Brass  
and Copper Rivets, Burrs, Washers,  
D. P. Tacks and Staples.

New York Agency, James S. Hender-  
son, successor to Disosway &  
Henderson, Hardware.

Agents for Philadelphia Star Carriage  
and Tire Bolts.

### REYNOLDS & CO.,

MANUFACTURERS OF



“V”

### Crimp Steel Roofing

Our illustrated catalogue will be  
sent free to any one upon application

may be applied to sheathing or  
directly over the old shingles without  
removing them.

It is so simple in its construction  
that any one can put it on and make  
a perfect job.

THE CINCINNATI CORRUGATING CO.

BOX 5, PIQUA, OHIO

### A TREATISE ON TOOTHED GEARING.

Containing complete instructions of Designing, Drawing, and Construct-  
ing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, &c.  
and the proper formation of Tooth Profiles. For the use of Machinists,  
Pattern Makers, Draughtsmen, Designers, Scientific Schools, &c. With many  
plates. By J. Howard Cromwell. 12mo, cloth. \$1.50.

Any Book Published Sent, Post-paid, on Receipt of the Price, by

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street, New York.



**ATLAS TACK CORPORATION.**

508 SEARS BUILDING, BOSTON, MASS., U. S. A.

BRANCHES: { **DUNBAR, HOBART & CO., WHITMAN, MASS.** **LORING & PARKS, PLYMOUTH, MASS.**  
ESTABLISHED IN 1810. ESTABLISHED IN 1842.  
**A. FIELD & SONS, TAUNTON, MASS.** **TAUNTON TACK CO., TAUNTON, MASS.**  
ESTABLISHED IN 1827. ESTABLISHED IN 1854.  
**AMERICAN TACK CO., FAIRHAVEN, MASS.** **OLD COLONY RIVET CO., PLYMOUTH, MASS.**  
ESTABLISHED IN 1867. ESTABLISHED IN 1866.

**MANUFACTURERS OF**

Tacks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungariae Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Escutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York store and our factories.

**MAIN OFFICE, 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.**

**BRANCH OFFICE & WAREHOUSE, 116 CHAMBERS ST., NEW YORK.**

**BRANCH OFFICE & WAREHOUSE, 239 & 241 LAKE ST., CHICAGO, ILL.**

**BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.**

**BRANCH OFFICE & WAREHOUSE, 406 COMMERCE ST., PHILADELPHIA, PA.**

# STEEL AND IRON BRIDGES.

Iron Buildings, Roofs and General Structural  
 Work in Iron and Steel, Machine  
 Shops, Foundries, Power  
 Houses, Etc.

We do every class of structural metal work at lowest prices, and guarantee satisfaction.

Please communicate with  
 nearest office.

**WROUGHT IRON BRIDGE CO.,**  
**CANTON, OHIO.**

**NEW YORK OFFICE,**  
 136 Liberty Street.

**CENTRAL OFFICE,**  
 Chicago, Ill.

**WESTERN OFFICE.**  
 Kansas City, Mo.

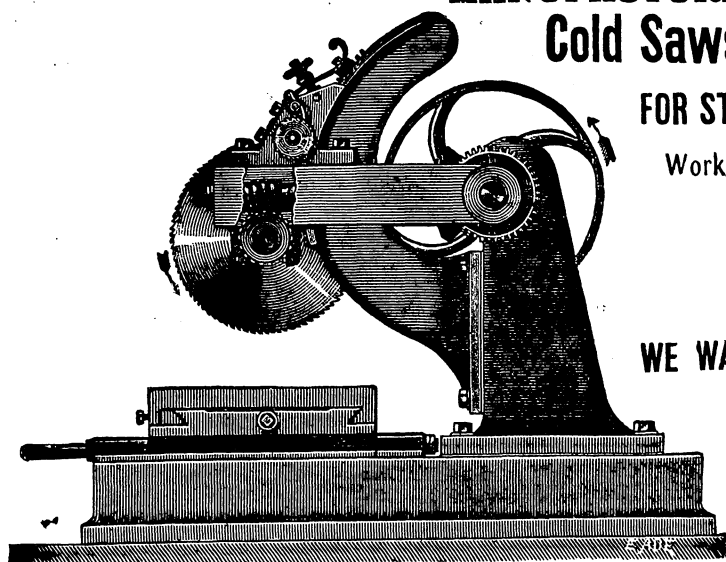
## GUSTAVE EHRHARDT & SONS,

MANUFACTURERS OF

### Cold Saws and Cold Sawing Machines

FOR STEEL, IRON AND OTHER METALS A SPECIALTY.

Works at Homewood Station, Pennsylvania Railroad,  
**PITTSBURGH, PA.**

**WE WARRANT**

Perfect workmanship,  
 Wear and cost of operating reduced to minimum,  
 Long life of saw-blade,  
 Full contact of teeth,  
 And best general results.

## SAWS

for Railroads, Steel Foundries,  
 Bridge Works, Rolling Mills,  
 Etc., a Specialty.

—AMERICAN—  
**PIG IRON Storage Warrant Co.**  
 (Bank of America Building.)  
 44 Wall Street, - NEW YORK  
 Correspondence of Furnaces Invited.

## IRON AND STEEL ROOFING,

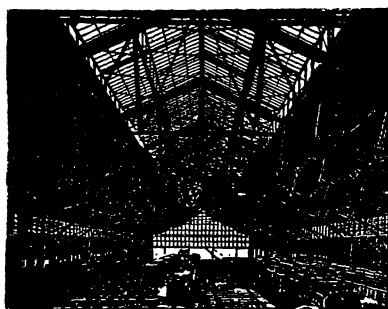
Corrugated Iron, Galvanized Eave Trough  
 and Conductor Pipe, Roofing Paints, etc.

**Cambridge Roofing Co., Cambridge, O.**

Corrugated, Crimped and Clap-Board Iron Roofing &amp; Siding



Iron Buildings, Roofs, Doors, Shutters, Cornices, Skylights, Bridges, &amp;c.

MOSELEY IRON BRIDGE AND ROOF CO.,  
Office, 5 Day Street, Room 13, NEW YORK.New Passenger Station, C. R. R. of  
N. J., Jersey City, N. J., over  
30,000 square feet of Glass.**SKYLIGHTS**

ERECTED ANYWHERE.

CONSTRUCTED ON  
"Helliwell System" Imperishable Glazing.  
(Sole Agents).Warranted tight and free from drip. Built by  
PLENTY HORTICULTURAL AND SKYLIGHT WORKS,  
145 Liberty St., New York City.  
Iron Palm-houses, Greenhouses, Conserva-  
tories and Skylights a Specialty.Illustrated Catalogue free. Correspondence  
Solicited.

A. MILNE &amp; CO.,

**Iron and Steel**IMPORTERS AND DEALERS,  
No. 1 Broadway, New York.  
8 Oliver St., Boston.

BORDEN &amp; LOVELL,

70 AND 71 WEST STREET  
NEW YORK.

Steel, Iron and Wire Nails.

CHAS. J. STEBBINS,

103 Reade St., New York,

Steel and Iron Nails.

PHILLIPS, TOWNSEND &amp; CO.,

North Penn Junction, Philadelphia.

WIRE NAILS, - - -

- - - NORWAY RIVETS.

Rivets marked "P" are not of our  
make. We make only first-class NORWAY  
IRON RIVETS.**Gautier Steel Department of Cambria Iron Co.,**

JOHNSTOWN, PA.,

MANUFACTURERS OF

**Merchant Bar Steel:**Including Tire, Toe Calk, Machinery, Carriage  
Spring, Railroad Spring, Hoe, Rake, Fork,  
etc.**Agricultural Steel and Shapes:**Finger Bars, Knife Backs, Rake Teeth, Bundle  
Carrier Teeth, Tedder Forks and Springs, Spring  
Harrow Teeth, Harrow (Drag) Teeth, Seat  
Springs, etc.**Plow Steel:**Flat and Finished Plow Shapes, Digger Blades,  
Slabs (Penn and Pernot), Hammered Lay,  
Rolled Lay, etc.

COLD ROLLED STEEL SHAFING.

STEEL HARROW DISCS.

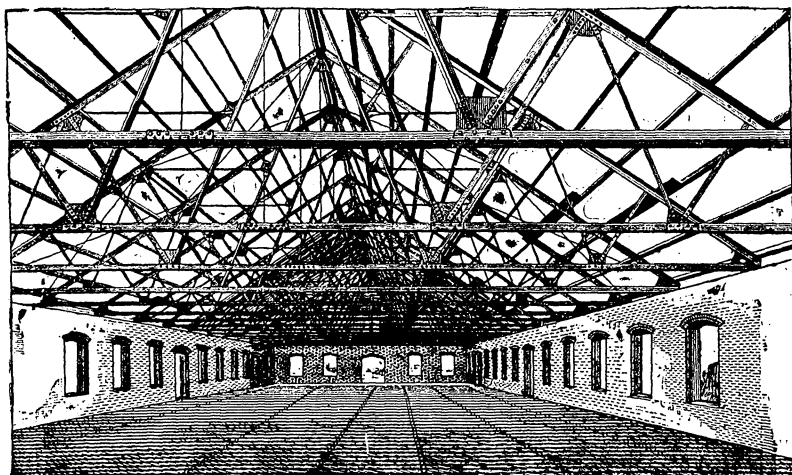
CAMBRIA LINK BARB WIRE.

New York Office, Philadelphia Office, Chicago Office  
102 Chambers St. S. W. Cor. 5th & Commerce Sts. 209 Phenix Building.  
(No. 4).

Mention The Iron Age,

**PROTECT**Your Offices, Stores and Warehouses from fire  
and burglars by using**Metallic Doors and Shutters**Made from wood and covered with iron or steel, render-  
ing them stiff and preventing warping in case of fire.  
Made from heavy boiler plate iron.  
Made from double corrugated iron or steel.  
Made to fit any size opening.

Estimates furnished upon application.

GARRY IRON & STEEL ROOFING CO.,  
CLEVELAND, OHIO.**IRON AND STEEL BRIDGES, ROOFS AND BUILDINGS****BOSTON BRIDGE WORKS,**Engineers and Builders,  
MASON BUILDING, BOSTON, MASS.

Roof of Machine Shop at Portsmouth (N. H.) Navy Yard.

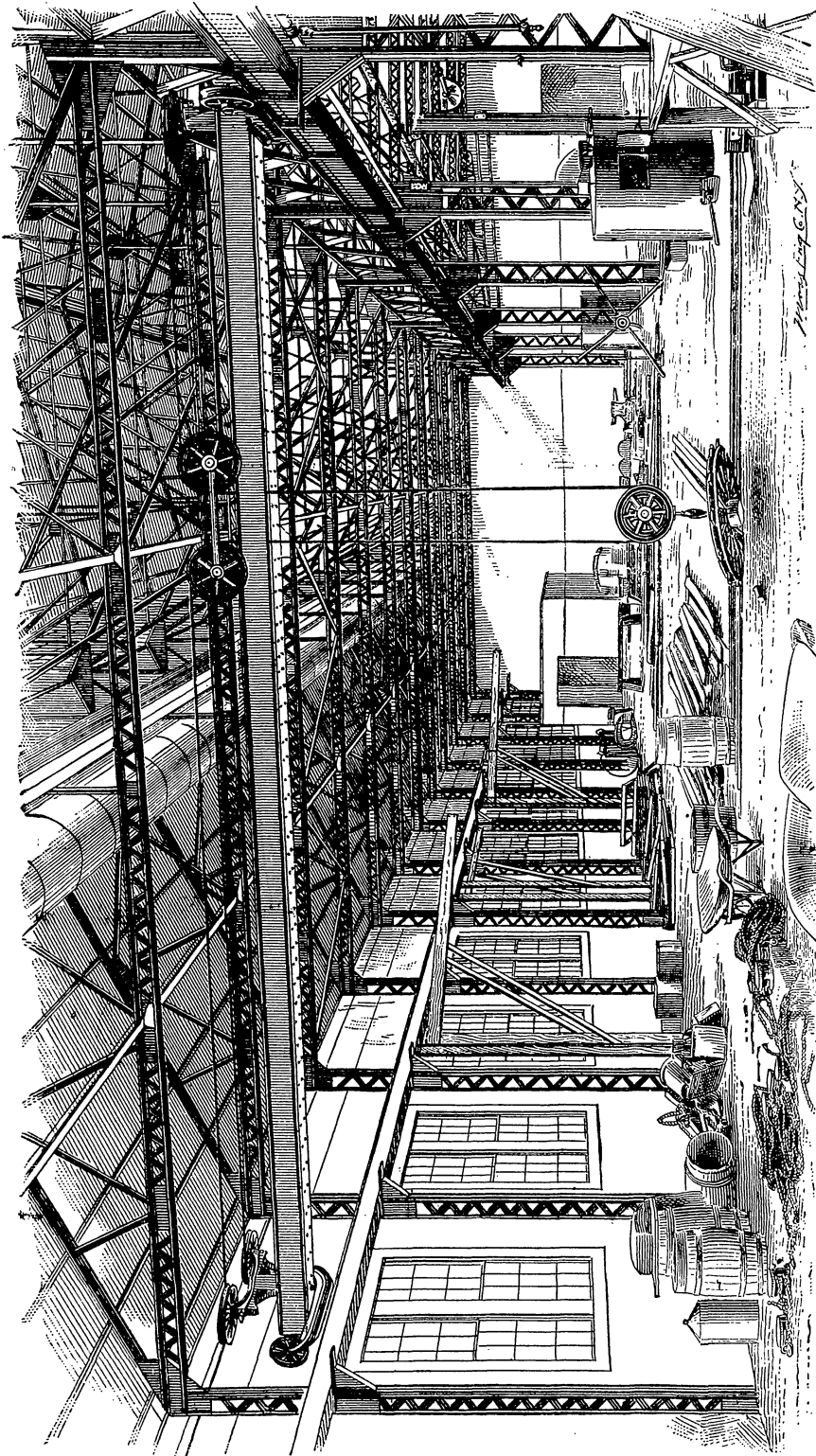
INQUIRIES SOLICITED.

O. H. ANDREWS, Prop'r,  
J. R. WORCESTER, Chief Eng'r.A. S. MILLER, Jr., Sec'y.  
F. H. BROWN, Con. Eng'r.

# The Berlin Iron Bridge Co.,

Engineers, Architects and Builders  
in Iron and Steel.

Office and Works, No. 5 Railroad Avenue,  
EAST BERLIN, CONN.



The above illustration is taken direct from a photograph, and shows the interior construction of an Iron Building designed and built by us for the Link Belt Engineering Co., at Nicetown, Philadelphia, Penn.

The building is 71 ft. in width by 180 ft. in length, divided into equal parts—one side being controlled by a traveling crane and the other side being controlled by jib cranes. The

photograph is taken looking through the portion of the building which is controlled by a traveling crane—this traveler being supported by

girders, which in turn are supported by a line of posts and girders through the center of the building. The

roof trusses are made of iron, with iron

purlins covered with corrugated iron.

SEND FOR ILLUSTRATED CATALOGUE.

CHAS. M. JARVIS,  
*Pres. and Chief Engineer.*

BURR K. FIELD,  
*Vice-President.*

GEO. H. SAGE,  
*Secretary.*

F. L. WILCOX,  
*Treasurer.*

**Lukens Iron and Steel Co.** INCORPORATED 1890.  
 The First to make Boiler Plates in America.  
 Chas. Huston, Pres. A. F. Huston, Vice-Pres. C. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.  
**STEEL AND IRON PLATES**  
 TO EXTREME DIMENSIONS. WIDTHS UP TO 10 FEET. THICKNESS, 3-16 INCH TO 1 1/4 INCH.  
 — ESTABLISHED 1810. —  
 WORKS: Coatesville, Pa. PHILADELPHIA OFFICE: 62 & 64 Bullitt Bldg.

FRANK SAMUEL,  
 136-138 So. 4th St.,  
 Philadelphia.

# LOW PHOSPHORUS

PIG IRON—.03 or under.  
 SCRAP—.03 or .05 or under.  
 ORE—For O. H. and Furnace Use.  
**MELTING BAR**—  
 Open Hearth and Bessemer Billets,  
 Skelp, Muck Bars and Scrap, Foundry  
 and Bessemer Pig Iron.  
 Syracuse Tube Co.'s Tubes and Pipe.

**THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,**

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

## WROUGHT IRON AND OPEN HEARTH STEEL.

Beams, Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes, Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes.  
 SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes, Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & Co., 29 Broadway, NEW YORK; EDWARD CORNING & Co., 70 Kilby St., BOSTON, MASS.; JAMES B. STOKES, 132 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 931 The Rookery, CHICAGO.

**POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA.**

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET  
 MANUFACTURERS OF ALL KINDS OF

## STRUCTURAL IRON AND STEEL,

Viz., I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

## TESTED CHAINS.

**BRADLEE - & - CO., - EMPIRE - CHAIN - WORKS**

Beach & Otis Sts., - - - Philadelphia.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging. Slope and Mining Chains. Ship's Cables and Marine Railway Chains.

**BARCLAY W. COTTON & CO.,**  
 Successors to ESHERICK, COTTON & CO.,

**IRON AND STEEL MERCHANTS,**

418 Walnut Street, - Philadelphia

WHEELER. G. W. NICOLLS  
**Nicolls, Wheeler & Co.,**

FORMERLY

SITES, WHEELER & CO.,  
 216 South Third Street, Philadelphia, Pa.  
 —DEALERS IN—

**IRON AND STEEL SCRAP,**

Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.  
 Steel and Iron Plates, New and Old Rails.

S. T. WELLMAN, President.

JOHN P. CROZER, Treasurer.

C. H. WELLMAN, Superintendent

S. H. CHAUVENET, Vice-President.

RICHARD PETERS, Jr., Secretary.

**WELLMAN IRON AND STEEL CO.**

—MANUFACTURERS OF—

Highest Grade Open Hearth Low Phosphorus Steel Fire Box and Boiler Plate. Bessemer Steel Ship and Tank Plate. Open Hearth and Bessemer Blooms and Slabs. Low Phosphorus Pig Iron.

— PLATES UP TO 126 INCHES IN WIDTH. —

General Office and Works, Thurlow, Delaware County, Pa.

Chicago, Ills., No. 656 "The Rookery."

New York, N. Y., No. 7 Nassau Street.

E. W. CRAMER, Agent.

J. H. BELCHER, Agent.

**EDWARD CORNING & CO.,**

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS.

BEAMS, CHANNELS,  
 ANGLES, TEES,  
 PLATES, BARS, RODS.

**IRON AND STEEL**

HOOPS, BANDS,  
 SPIKES, FISH-PLATES,  
 BOLTS, NUTS, RIVETS.

29 BROADWAY,  
**NEW YORK.**

237 SO. THIRD ST.,  
**PHILADELPHIA.**

70 KILBY ST.,  
**BOSTON.**

CORRESPONDENCE SOLICITED WITH BUYERS AND WITH MANUFACTURERS

W. S. PILLING.

T. I. CRANE

**PILLING—AND—CRANE.****IRON ORES:** Lake Superior, Foreign, Concentrates. Magnetic and native Self-fluxing.**PIC IRON:** Low Phosphorus, Open-hearth, Bessemer and other grades.**STEEL:** In Blooms, Slabs and Billets, and scrap.**COKE:** For Furnace and Foundry use.

BULLITT BUILDING, 141 S. FOURTH ST. PHILADELPHIA.

**E. R. MANN & CO.,**

Sole Agents.

**ACME PIG IRON.**

Guaranteed .03 % or lower in Phosphorus.

Blooms, Slabs, Plates, Sheets, Skelp, Muck-Bar and Scrap. Foreign and American Ore. Riverside Steel Pipe. Syracuse Boiler Tubes.

147 SOUTH 4th STREET, - - PHILADELPHIA

**ALAN WOOD COMPANY,**

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,

**PLATE & SHEET IRON.**

ALSO LIGHT PLATES AND SHEETS OF STEEL,

No. 519 Arch Street, Philadelphia. Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack Tank and Boat Iron; Last, Stamping, Ferrule Locomotive Headlight and Jacket Iron.

**CUMBERLAND NAIL AND IRON CO.,**

MANUFACTURERS OF

**"CUMBERLAND" NAILS & WROUGHT IRON PIPE,**

43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

**J. J. MOHR,**

Bullitt Building, No. 131 South Fourth St., Philadelphia, Pa

—SOLE AGENT FOR—

Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUNDRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.

Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

**High Grade Tested Chains.**

JAMES McKAY &amp; CO., 29th and Liberty Sts., Pittsburgh, Pa.,

Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

**JAMES G. LINDSAY & CO.,**

BULLITT BUILDING, 133 South Fourth St., PHILA.

**IRON & STEEL STRUCTURAL MATERIAL**

For all Purposes. Estimates Furnished for Iron and Steel Structures.



MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E.D., N. Y

**FITZSIMONS & CO.,**

—MANUFACTURERS—

**COLD  
DRAWN****SHAFTING****IRON  
STEEL**

CLEVELAND, OHIO.

**EDWARD J. ETTING,**  
IRON BROKER & COMMISSION MERCHANT  
222 S. THIRD ST., PHILADELPHIA, PA.  
Pig, Bar and Railroad Iron, Old Rails, Scrap.AGENT FOR THE  
**MOUNT SAVAGE FIRE BRICK,**  
Eastern Penna., West New Jersey and Delaware.**Agent TRENTON IRON CO.,**

For the Sale of Wire and Wire Rope.

Longdale (Va.) and other Pig Irons.

STORAGE YARD, Pier No. 57 South (old Navy Yard), which is connected with Penn. R. R. and its various connections. Negotiable Warehouse Receipts issued. CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.

**JEROME KEELEY & CO.,**

303 WALNUT STREET, PHILADELPHIA.

**Foundry & Forge Pig Irons,****Iron Ores, Coke, Coal,****Steel Blooms, Billets, Rails, etc.**  
**Muck Bars, Blooms, Scrap Iron.**

Consulting Engineers in Metallurgy and Mining.

G. H. Wilson.

A. Kaiser.

J. B. M. Hiron

**E. H. WILSON & CO.,**

222 and 224 South Third St., Philadelphia,

BROKERS AND DEALERS IN

**IRON AND STEEL.**

Correspondence solicited.

**J. W. Hoffman & Co.,**

333 and 335 Walnut Street,

**COMMISSION MERCHANTS,****PIG IRON,**

Iron and Steel Plates and Shapes. Rails, Cars and Locomotives, and Railroad Equipment generally.

CORRESPONDENCE SOLICITED.

**JOHN L. HOGAN & CO.**

IRON COMMISSION MERCHANTS,

Bullitt Building, 135 South Fourth St., Phila.

Agents for Briar Hill, Lehigh, Struthers,

**AND MURKIRK PIG IRON,**

Delaware Rolling Mill, muck bars, Youngstown Steel Co., Connellsville Coke.

**NORTH BROTHERS MFG. CO.****Iron and Brass Founders,***Light Castings a Specialty.*N. W. Cor. 23d and Race Streets,  
PHILADELPHIA.

Correspondence solicited.

**A. R. WHITNEY & CO.,**

MANUFACTURERS AND DEALERS IN

**IRON and STEEL.**

AGENCIES:

CARNEGIE STEEL CO., Limited, Structural Material, Steel and Iron Columns, Beams, Channels, Shapes and Plates. Steel Beams Rolled to 24 inches deep.

PORTAGE IRON CO., Limited, Merchant Iron, Bars, Angles, Hoops and Cotton Ties.

BROOKLYN WIRE NAIL CO., Steel Wire Nails. Export Nails a Specialty.

RIVERSIDE IRON WORKS, Steel Pipe.

GLASGOW TUBE WORKS, Boiler Flues.

AMERICAN WIRE NAIL MACHINES. Over 900 working satisfactorily in the United States, 25 in Europe and 100 in Canada.

THE SEIDELL &amp; HASTINGS CO., Charcoal-Iron Boiler Plates.

Plans and estimates furnished and contracts made for Iron and Steel structures of every description. Please address,

29 Broadway, New York.

P. O. Box 33.

C. B. Houston. J. Max Bernard. H. H. Houston.

**C. B. HOUSTON & CO.,**

Bullitt Building. PHILADELPHIA.

**Foundry, Forge and Bessemer Pig****Irons. Coal, Coke and Steel Rails.**

Sole Agents for PAXTON ROLLING MILLS.

**STEEL AND IRON PLATES.**

# FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,  
DON STEEL WORKS, SHEFFIELD,

Sole Manufacturers of

HOBSON'S "CHOICE" (XX) Extra Best and "Warranted Best"  
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire.

SEAMAN'S "NELSON" Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.  
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

## THOS. FIRTH & SONS, LIMITED, SHEFFIELD. CRUCIBLE CAST STEEL.

JERE ABBOTT & CO., Agents and Importers of  
**SWEDISH IRON,**

85 OLIVER ST. BOSTON.

23 CLIFF ST., NEW YORK

## S. & C. WARDLOW, SHEFFIELD, ENGLAND

Manufacturers of the Celebrated Cast and Double Shear Steel,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch and all other Springs; also Sole Makers of the Special Brand "TOUGH" Cast Steel for Leather Splitting and Machine Knives of every description, and for Turning and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York.

Frank S. Pilditch, Agent.

## GUSTAF LUNDBERG,

AGENT FOR N. M. HÖGLUND'S SONS & CO., OF STOCKHOLM

**Swedish and Norway Iron.**

Bessemer and Open Hearth Steel.

19 KILBY STREET, BOSTON.

CARLISLE **KAYSER, ELLISON & CO.,** SHEFFIELD, ENGLAND,  
WORKS, Late WILSON HAWKSWORTH, ELLISON & CO.,  
(ESTABLISHED 1825.)

**CRUCIBLE STEEL AND STEEL WIRE.**

WETHERELL BROS., Agents,

81 OLIVER STREET, BOSTON.

98 LIBERTY STREET, NEW YORK.

## JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Corset Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes.

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER).

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

# JESSOP'S STEEL

MANUFACTURED BY

WM. JESSOP & SONS, L'D.

OF Best Quality,  
IN Bars, Sheets and Plates

Large assortment of sizes in stock at

91 John St. - - - - - NEW YORK

And other Agencies.

SHEFFIELD,  
ENGLAND.

Gold Medal Paris.  
1889.

# WIRE

DRAWING

**WORTLES, PLATES and JEWEL DIES.**

# DIES

NEWTON & SHIPMAN.

83 John St., - New York.



**PENNSYLVANIA STEEL COMPANY.** WORKS AT STEELTON, PA.

RAILS OF ALL SIZES & SHAPES. STEEL SPICES, FASTENINGS, ANGLES & BARS, SWITCH FIXTURES & C. & C. CROSSINGS, RAILROAD FROGS AND SWITCHES, FOR TRACKS OF ALL SORTS, IN RAILROADS, STREET RAILWAYS, MINES, QUARRIES, MILLS, FACTORIES, & WORKS.

STEEL SPLICES, FASTENINGS, BOILER BRIDGES, ROOFS, VIADUCTS & BUILDINGS, TANK & SHIP PLATE, RIVETS, WIRE, NAILS, AND VARIOUS PURPOSES.

GENERAL OFFICES, 108 So. Fourth St., PHILADELPHIA. NEW YORK SALES OFFICE, No. 2 Wall Street (corner Broadway). BOSTON SALES OFFICE, 70 Kilby Street (Mason Building). SUPERINTENDENT'S OFFICE, STEELTON, PA.

## ÆTNA IRON and STEEL COMPANY, BRIDGEPORT, OHIO.

MANUFACTURERS OF

### Soft Steel and Refined Iron,

Bars, Light Section Rails, Angles, Ties, Grooves and Other Special Shapes, Steel Tool Smoke Stack and Tank Sheets and Roofing Sheets. Special attention to orders for Bars or Sheets of odd sizes and shapes, or for special purposes.

## ILLINOIS STEEL COMPANY

General Offices, TENTH FLOOR, "ROOKERY," CHICAGO, ILL.,

— MANUFACTURE —

### Bessemer, Foundry and Mill Pig Iron, Spiegel and Ferro-Manganese,

Iron and Steel Merchant Bar, Rail Fastenings, Light "T" and Street Rails,

Steel Billets, Wire Rods, Iron or Steel Car Truck Channels,

Steel "I" Beams and Structural Shapes, and

## BESSEMER STEEL RAILS.

Julian L. Yale,

Gen'l Sales Agent.

A. M. Crane,

Assistant Gen'l Sales Agent.

New York Office, 46 Wall St., New York City. Milwaukee Office, 151 N. W. Ins. Bldg., Milwaukee, Wis. D. E. GARRISON & CO., Agents, Laclede Building, St. Louis, Mo.

H. S. PICKANDS, } CHICAGO.  
W. L. BROWN, }

## PICKANDS, BROWN & CO.,

PICKANDS, MATHER & Co  
CLEVELAND.

Sole Agents Pig Iron Department Illinois Steel Company and Manufacturers and Dealers in

## PIG IRON and IRON ORE,

1007, 1009 and 1011 Rookery Building, Chicago.

## CARBON STEEL COMPANY,

PITTSBURGH, PA.,

— MANUFACTURERS OF —



Universal Mill Plates. Sheared Plates and Sheets. Boiler, Ship and Armor Plates. Also Nickel Steel Plates. List of Sizes Sent upon Application.

### AGENCIES:

L. S. BOOMER, 647 The Rookery, Chicago, Ill. THE CONDIT-FULLER CO., Perry-Payne Building, Cleveland, O.  
GEO. KINSEY & CO., 249 West Fourth Street, Cincinnati, O. JAS. G. LINDSAY & CO., Bullitt Building, Philadelphia, Pa.

# CAMBRIA STEEL,

**Steel Rails, STANDARD AND LIGHT WEIGHTS, Street Rails and Railway Fastenings,**  
**BESSEMER AND OPEN-HEARTH BLOOMS, BILLETS AND BARS.**  
**Steel Axles, Steel Angles, Steel Channels, Steel Forgings,**  
**CAMBRIA IRON COMPANY,** Office, 218 S. Fourth St., Philadelphia.  
 Chicago Office, Phoenix Building.  
 (WORKS AT JOHNSTOWN, PA.)

**A. & P. ROBERTS & COMPANY,**  
**Pencoyd Iron Works,** MANUFACTURERS OF  
**Wrought Iron and Open Hearth Steel,**  
 OFFICE: 261 S. 4th Street, PHILADELPHIA, Pa.

**Pencoyd Bridge & Construction Co.,** DESIGNERS AND MANUFACTURERS OF  
 Bridges, Viaducts, Turn Tables, Etc.  
 WORKS, PENCLOYD, PA.

**LUCKNOW FORGE.**  
**JOHN W. REILY**  
 Fort Hunter, P. O., Dauphin Co., Pa.  
 MANUFACTURER OF  
 Blooms and Billets for Boiler Plate, Tubes,  
 Sheet Iron and Wire, made from  
 Pig Iron and Scrap.  
 Prices Quoted—Correspondence Solicited

**GEO. H. SIBELL & CO.,**  
 Brokers and Commission Merchants,  
 62-64 Michigan Ave., Chicago.  
**PIG IRON, COKE, FIRE BRICK, RAILROAD**  
**IRON, CAST AND WROUGHT SCRAP.**  
 Price Quoted. Correspondence Invited.

## —THE— Chemical Analysis of Iron

A Complete Account of all the Best  
 Known Methods for the  
 Analysis of Iron, Steel, Pig Iron, Iron  
 Ore, Limestone, Slag, Clay, Sand,  
 Coal, Coke, and Furnace and  
 Producer Gases.

SECOND EDITION.

—BY—  
**ANDREW ALEXANDER BLAIR,**

Graduate United States Naval Academy, 1886; Chief  
 Chemist United States Board, appointed to Test  
 Iron, Steel and other Metals, 1875; Chief Chem-  
 ist United States Geological Survey and  
 Tenth Census, 1880; Member American  
 Philosophical Society, etc.

Handsomely Illustrated by 120 Outline  
 Engravings on Wood. Svo. 314 Pages.  
 Half Morocco. \$4.00.

The reputation which this book has so quickly won  
 for itself among analytical chemists will certainly be  
 increased by the improvements in the second edition.  
 Every means has been taken to bring it up fully to the  
 times, by incorporating all the new and improved  
 methods, necessitating the addition of thirty pages of  
 letterpress and nine new cuts.

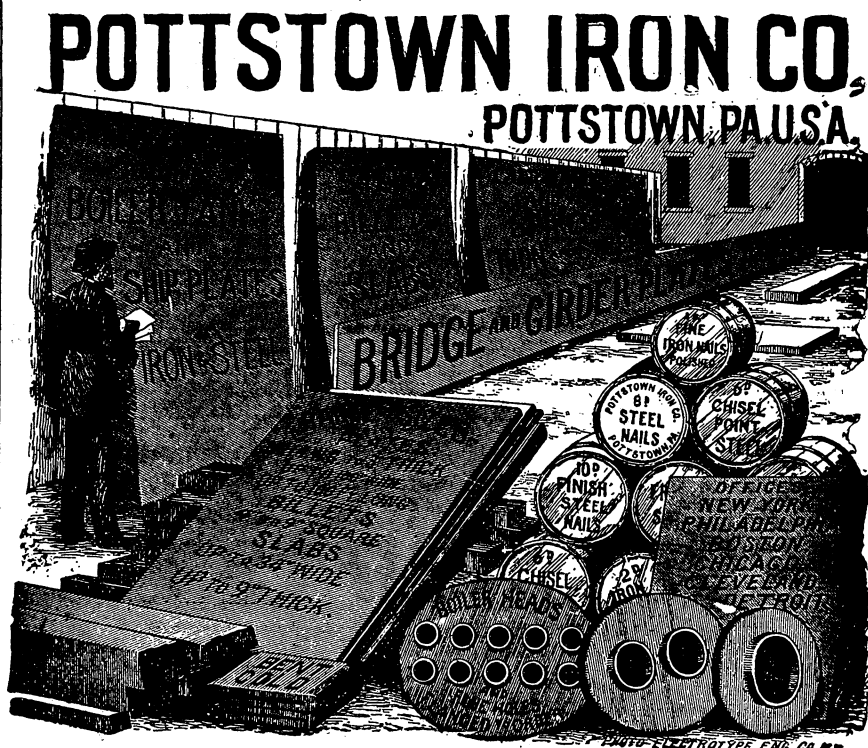
"This work may, in fine, be pronounced a useful  
 summary of a special and important department of  
 analytical chemistry by an author of prolonged and  
 wide practical experience."—*Chemical News*, London.

"Mr. Blair's is a standard work which will prove  
 the chief guide of the young chemist, and a frequent  
 guide to more experienced analysts."—*The Iron Age*  
 New York.

"All iron chemists will find this book an exceedingly  
 useful laboratory companion."—*The Chemical Review*  
 London.

"It is thorough, accurate, and so complete, as to be  
 practically exhaustive of the important subject of  
 which it treats."—*Philadelphia Iron*.

—FOR—  
 SALE BY **DAVID WILLIAMS**  
 Publisher and Bookseller,  
 96-102 Reade St., New York.



## WHEELING STEEL AND IRON CO.,

OFFICE, No. 11 FOURTEENTH ST., WHEELING, W. VA.

MANUFACTURERS OF ALL GRADES OF

**Pig Iron, Muck Iron, Bessemer Steel Slabs and Billets, Iron and  
 Steel Skelp, Sheet Iron, Sheet Bars, Tack Plate and Nails.**

The Benwood Iron Works, Belmont Nail Co. and the Wheeling Iron and  
 Nail Co., with the Wheeling Steel Works, have been consolidated into this  
 ONE COMPANY. All communications for either of the above should be ad-  
 dressed to the

**WHEELING STEEL AND IRON CO.**

## DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.

Sole Manufacturers of Ahlstrom's Patent Parallel Double

**EXPANSION BOLTS,**

also Single Expansion Bolts. Catalogues mailed on application

**W. C. BOONE MFG. CO., - Office and Factory, - BOONTON, N. J.**

## THE ASCHMAN STEEL CASTING CO.,

MANUFACTURERS OF

**Open Hearth Steel Castings of all Kinds.**

Solid and Equal to Steel Forgings.

Send Sketch and Get Estimate.

Prompt Delivery.

OFFICE AND WORKS, SHARON, PA.

# THE BETHLEHEM IRON COMPANY.

SOUTH BETHLEHEM, PENNA.

STEEL RAILS,

BILLETS AND MUCK BAR,

STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - 80 BROADWAY.

PASSAIC ROLLING MILL CO., Paterson, N. J.

—MANUFACTURE—

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Work, Forgings, Eye Bars, &amp;c., &amp;c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

## JUSTICE COX, Jr., IRON AND STEEL,

No. 218 SOUTH 4th ST., PHILA'D, PA.

Agent for Haldeman, Grubb & Co.'s Chickies Bessemer Pig Iron,  
Mahoning Rolling Mill Co.'s Best Quality Skelp Iron and Steel,  
Pulaski Iron Co.'s High Grade Foundry and Forge Pig Iron.

Bars, Angles, Sheets, Tank and Bridge Plates, Muck Bars, Blooms, Scrap Iron and Tool Steel.

## THE MONTGOMERY IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS,

Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

## NAYLOR & CO.,

New York: 45 Wall Street.

PITTSBURGH, PA.: Lewis Block. PHILADELPHIA, PA.: Bullitt Bldg.  
CINCINNATI, OHIO: Johnston Bldg.

## IRON ORE, PIG IRON, SPIEGEL AND FERRO,

IRON AND STEEL WIRE ROOPS, STEEL BLOOMS, BILLETS AND SLABS, METALS AND OLD MATERIALS.

## R. MUSHET'S "SPECIAL," STEEL "TITANIC,"

FOR LATHE AND PLANNER TOOLS.

(The "Trade-Marks" of which are registered in the United States.)

MANUFACTURED ONLY BY

SAMUEL OSBORN &amp; CO., - - - Clyde Steel &amp; Iron Works, Sheffield, Eng.

SOLE REPRESENTATIVES IN THE UNITED STATES.

B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.  
No. 143 LIBERTY STREET, NEW YORK.

STEEL

Gautier Steel.

SEE PAGE 16

## IRON AND STEEL

BARS, ANGLES, CHANNELS, BEAMS AND STRUCTURAL SHAPES.

Bridge, Boiler, Tank and Ship Plates.

FOUNDRY and FORGE

Pig Iron, Steel Slabs, Billets and Ingots

CHARLES K. BARNS &amp; CO..

224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO.,  
IRON COMMISSION MERCHANTS,

257 So. 4th St., Philadelphia.

Agents for the following Foundry and Forge Pig Irons: Dunbar, Kemble, Tinscarwas (Black Band), Wyebrake C. B. Charcoal Pig Iron, Warner &amp; Co.'s (Middletown, England) Carbonizing and Malleable Irons. Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO.,  
Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler and Sheet Iron and General Railway Equipments.

Old Rails, Axles and Wheels bought and sold.  
234 S. 4th St., Philadelphia.

Established 1847.

A. WHITNEY & SONS,  
CAR WHEEL WORKS,  
PHILADELPHIA:

Special Wheels for Furnace and Mine Cars.

Manhattan Rolling Mill.

JOHN LEONARD,  
446 to 452 West St., New York.

MANUFACTURER OF

HORSE SHOE AND BAR IRON  
BLACKSMITH SUPPLIES.

Brooklyn Branch, 589 Kent Ave.

OGDEN &amp; WALLACE,

85, 87, 89 &amp; 91 Elm St., New York.

IRON AND STEEL

Of every description kept in stock.

Agents for Park, Brother &amp; Co.'s

BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly on hand

WILLIAM H. WALLACE & CO.,  
IRON AND STEEL,

10, 12 and 14 ALBANY ST.,

and 131 WASHINGTON ST.,

NEW YORK.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

THE MAHONING VALLEY IRON CO.,

—MANUFACTURERS OF—

Bar, Band, Sheet, Plate and Tank Iron,  
Angle Iron, Nails, Boat Spikes and Rivets.

YOUNGSTOWN, OHIO.

ESTABLISHED IN 1848. **SINGER, NIMICK & CO., Ltd.** PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled **STEEL.** Warranted Equal to any Produced.



**HIGH GRADE SPECIAL** Crucible Tool Cast Steel, for all purposes requiring the very finest quality.

**SINGER'S ANNEALED EXTRA** Crucible Tool Cast Steel, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an extra fine quality.

**BEST** Crucible Tool Cast Steel, for all purposes requiring steel of **Standard** quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.

**SAW STEEL**, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

**HOT ROLLED SHEET STEEL**, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.

**BRIGHT COLD ROLLED SHEET and STRIP STEEL**, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs, Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequaled finish and accuracy of gauge.

**ROUND MACHINERY STEEL**, for Shafting, Rollers, Spindles, &c., &c.

**AGRICULTURAL STEEL.**

"Iron Centre" Cast Plow Steel.  
"Soft Steel Centre" Cast Plow Steel.  
"Soft Steel Back" Cast Plow Steel.  
"Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft-Center) Plow Steel.  
Crucible Cast Plow Steel.  
Steel Rotary Harrow Discs.  
Finished Rolling Plow Cutters.  
Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at 243 Pearl and 18 Cliff Streets, NEW YORK, by

**HOGAN & SON, General Agents for Eastern and New England States.**

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

**LA BELLE STEEL CO.,**

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa

MANUFACTURERS OF ALL KINDS OF **STEEL** SPRINGS, AXLES, RAKE TEETH, Etc.

**WETHERELL BROS.,** EASTERN REPRESENTATIVES, 31 Oliver St., Boston and 93 Liberty St. N.Y.

RICE, LEWIS & SON, Toronto, Ont.

**J. TATNALL LEA & CO.,**

No. 400 Chestnut Street, Philadelphia.

**BESSEMER, MILL AND FOUNDRY PIG IRON,  
MUCK BARS AND IRON ORES.**

**W. Dewees Wood Co.,**



MANUFACTURERS OF PATENT

**PLANISHED SHEET IRON.**

PATENTED

Oct. 6th, 1874.	Feb. 12th, 1884.	March 4th, 1884.
Oct. 17th, 1876.	Sept. 9th, 1878.	April 15th, 1884.
Feb. 6th, 1877.	Jan. 11th, 1876.	June 10th, 1884.
Jan. 10th, 1882.	Dec. 10th, 1878.	Jan. 6th, 1885.
Jan. 1st, 1884.		Aug. 31, 1886.

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

—ALSO—

Wood's Smooth Finished Sheet Irons and Sheet Steel Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS:

**McKEESPORT, PA.**

Branch Office: 111 Water Street, Pittsburgh, Pa.

**J. WESLEY PULLMAN,**  
No. 238 S. Third St., Philadelphia,  
**BEST IRON ORES**  
New Jersey. New York. Lake Superior  
WARWICK PIG IRON

— SOHO IRON & STEEL WORKS —

**MOORHEAD & McCLEANE CO.**  
MANUFACTURERS OF  
**PLATE IRON & STEEL.**  
**GALVANIZED SHEET IRON**  
**SOHO CHB TRADE MARK**  
PLATES SPECIAL WIDE SHEETS AND EXTRA LONG SKELP IRONS CORRUGATED & ROOFING IRONS  
OFFICES AND WORKS.  
**PITTSBURGH.**  
EASTERN WAREHOUSE. WESTERN WAREHOUSE.  
No. 81 JOHN STREET, Nos. 16 & 18 W. LAKE ST.  
NEW YORK. CHICAGO.

**SCULLY STEEL AND IRON CO.,**

Office, 64 So. Canal St., Chicago. Warehouses, { 62, 64, 66 So. Canal St.  
61, 63, 65 W. Water St.

Steel and Iron Plates, Sheets, Boiler Tubes, Rivets, Angles, Tees, etc.

**RAILWAY SUPPLIES.**

Western Agents for LUKEN'S IRON & STEEL CO., Coatesville, Pa.; J. WOOD & BROS. CO., Conshohocken Pa.; DIAMOND STATE IRON CO., Wilmington, Del.

# ELECTRIC ARC PROCESS OF METAL WORKING.

The fundamental claims covering the practical utilization of the intense heat of the electric arc for metal-working purposes are patented to the **THOMSON ELECTRIC WELDING COMPANY, 89 State St., Boston, Mass.**

This system is capable of extended application to metal-working operations, and is **safe** and economical.

It is adapted to Longitudinal welding of pipes, sheet-metal articles, &c., closing up blow-holes in Steel, Iron, Brass and Copper Castings and locally treating or working metal articles of all kinds.

Special generators are supplied or current may be taken from local power or lighting mains.

Applications for license should be addressed to

**THOMSON ELECTRIC WELDING COMPANY,**

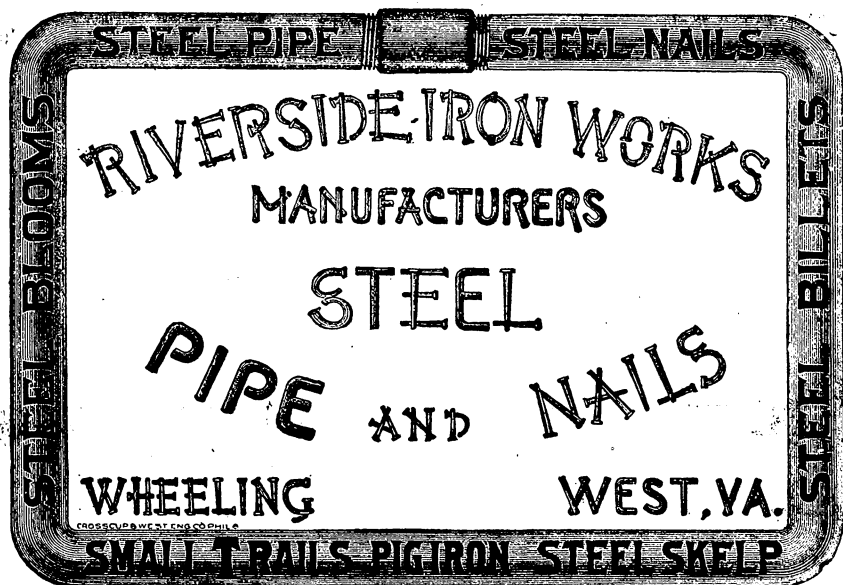
**89 State Street, Boston, Mass.**

## STEEL CASTINGS,

## HEAVY and LIGHT,

For railroads, mills, gearing, machinery, mining, construction and all purposes where extra strength or hardness is required. Made by

**Shickle-Harrison & Howard Iron Co., St. Louis**



Hundreds of testimonials showing these castings have proved the most satisfactory and economical for all purposes requiring strength and durability.

**CHROME STEEL WORKS,**  
Brooklyn, N. Y.

## The Practical Brass and Iron Founder's Guide.

A Treatise on Brass Founding, Molding, the Metals and their Alloys, etc.

By **JAMES LARKIN,**

Late Conductor of the Brass Foundry Department  
the Penn Works, Philadelphia.

A New Revised and Greatly Enlarged Edition.

### CONTENTS:

Among the most important and entirely new sections of this edition of this valuable and popular book are the following:

Behavior of Metals and Alloys in Melting and Congealing; Malleable Iron Castings; Wrought Iron or Mitis Castings; Manufacture of Steel Castings; Casting of Brass; Casting of Bronze; Bell Founding; Chill Casting; Casting without Core; Casting on to other Metals; Casting Iron and other Metals upon Lace, Embroideries, Fern Leaves and other Combustible Materials; Some Modern Bronzes.

In one volume, 12mo, 400 pages, \$2.50.

Sent, post-paid, on receipt of price by

**DAVID WILLIAMS,**

*Bookseller and Publisher,*

**96-102 READE ST., N. Y.**

## TAYLOR IRON AND STEEL COMPANY. STEEL FOUNDERS

Licenses in the United States for making Hadfield's Manganese Steel.

**STEEL CASTINGS OF EVERY DESCRIPTION.**

*Specialties: Steel Tired and Solid Steel Wheels; Chilled Iron Wheels; Iron and Steel Axles, etc., etc.*

General Office and Works,

**High Bridge, New Jersey.**



John H. Ricketson, Prest. Wm. Holmes, Treas.  
A. G. Barnett, Sec'y.

**A. CARRISON FOUNDRY CO.,**  
Manufacturers of Sand, Patent Homogeneous,  
Steel and

## Chilled Rolls

Ore and Clay Pulverizers, Rotary Squeezers,  
Haskin's Patent Double Spiral Pinions and Rolling  
Mill Castings of every description.

Office, Nos. 10 & 12 WOOD ST., PITTSBURGH, PA.

**BIRMINGHAM IRON FOUNDRY,**  
BIRMINGHAM, CONN.

CHILLED ROLLS AND ROLLING  
MILL MACHINERY,  
McCoy Patent Mill Pinions,  
Shears, Rotary Squeezers.  
**WIRE DRAWING MACHINERY**  
Special Rolling Machines for Gun Bar-  
rels, Hoes, Pick and Axe Polls, Odd  
Shapes and Tapers.

ESTABLISHED 1836.

**FINE GRAY IRON**  
FRANKLIN IRON FOUNDRY,  
The Burr and Houston Company  
33-39 Franklin Street, Brooklyn (Green-  
point), N. Y.  
Special Attention Given to Fine Castings.  
Telephone Call, Greenpoint 174.

## POWDER

—FOR—  
Blasting, Mining and Sporting.  
**ORANGE BRAND.**  
**ELECTRIC BLASTING APPARATUS,**  
**SAFETY FUSE, &c.**

Send postal card for Illustrated Pamphlet  
showing sizes grains Powder, and describing  
Blasting Apparatus. Mailed **FREE**.

**LAFLIN & RAND POWDER CO.,**  
New York Office, 29 Murray St.

## DYNAMITE,

**RED STAR BRAND**

For Mining, Quarrying and Stump Blasting.

Safety Fuse, Caps, Platinum Fuse, Leads,  
and Connecting Wire, with every other requi-  
site for Blasting Purposes. The especial at-  
tention of the hardware trade is invited to  
line of goods.

**NEW YORK POWDER CO.,**  
62 Liberty St., New York.

Open Hearth Steel Castings of  
Superior Quality.

**THE SYRACUSE STEEL FOUNDRY CO.**  
135 West Fayette St., Syracuse, N. Y.  
Prices on application

**CHESS BROTHERS,**  
MANUFACTURERS OF A FULL LINE OF  
**SMALL CUT NAILS, TACKS, SHOE NAILS, ETC.**  
Always in stock. Special goods made to order.

**SOFT STEEL PLATES.**  
Suitable for Implement manufacture and for all Blanking or Stamping uses,  
of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive, in  
widths up to 15½ inches and to multiples of lengths desired. Finished black or  
scaled. And

**EXPANDED METAL**  
In all its varieties of Fire-Proof Lath Fencing, Tree Guards, &c. Send for catalogues  
and prices.

Office, 531 Wood St., PITTSBURGH, PA.

**DROP FORGING**  
J. C. SPEIRS & CO. WORCESTER, MASS.

J.S. SEAMAN.  
ROBT. SLEETH  
GEO. P. BLACK

**PHOENIX ROLLWORKS**  
**SEAMAN, SLEETH & BLACK**  
OFFICE & WORKS  
41ST & 42ND ST & AV. R.  
PITTSBURGH, PA.

ROLLS AND PINIONS  
EXCLUSIVELY  
FOR ALL PURPOSES.

MANUFACTURE AND FINISH  
ESTABLISHED 1870

ROLLS. ESTD. AND 1863. PINIONS.

**THE TOTTEN & HOGG**  
**IRON & STEEL**  
**FOUNDRY CO.**  
OFFICE & WORKS  
24TH ST & AV. R.  
PITTSBURGH, PA.

CHILLED &  
SAND ROLLS  
ROCK CRUSHERS.

SHEARS  
SQUEEZERS AND ROLLING MILL MACHINERY.

**THE CAMBRIDGE IRON & STEEL CO.**  
MANUFACTURERS OF  
**SHEET IRON AND SHEET STEEL**

Squared Roofing Sheets a Specialty.

CAPACITY RANGES FROM NO. 30  
26 INCHES WIDE TO 1-4 X 40 X 20

**CAMBRIDGE REFINED IRON.** **CAMBRIDGE SOFT STEEL.**

TRADE MARK

CORRESPONDENCE SOLICITED

OFFICE AND WORKS CAMBRIDGE, OHIO.

—ESTABLISHED 1850.—  
**ARCADE MALLEABLE IRON CO.**  
WARREN McFARLAND & CO.  
Malleable Iron and Steel Castings,  
WORCESTER, MASS.  
Correspondence solicited. Prices given upon receipt of patterns  
or samples. **GEO. B. BUCKINGHAM.**

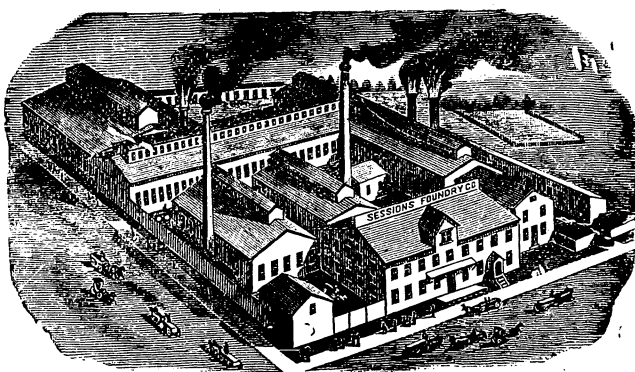


## IRON CASTINGS TO ORDER.

Small and Large Grey (or common) Iron Castings of uncommonly fine quality. Four large Cupolas run daily. Castings soft, smooth and strong. Prices very Low.

We make Castings for all purposes, such as Builders' and Domestic Hardware, Electrical work, Piano and Organ, Wringer, Furniture, Lamp and Chandler and Agricultural Implement Castings, Grates, Furnace and Machinery Castings, &c., &c. If you buy any, write us, stating quantities. Send samples if possible.

**SESSIONS FOUNDRY CO., Bristol. Conn.**



## Books for Assayers

### The Assayer's Manual.

An abridged treatise on the docimastic examination of ores and furnace and other artificial products. By BRUNO KERL; from the German by W. T. BRANNT; second American edition, edited, with additions, by F. LYNWOOD GARRISON; 354 pages, illustrated cloth.....\$3

### Notes on the Chemistry of Iron.

For professional men, students, iron and steel merchants and all interested in iron. Explaining the methods of analysis, and how to apply the results obtained. Third edition, revised and enlarged. By MAGNUS THOIL- IUS; 143 pages; cloth.....\$2

### System of Quantitative Chemical Analysis.

Edited by PROF. O. D. ALLEN, assisted by PROF. S. W. JOHNSON. Revised and corrected by DR. C. R. PRESENTUS; 883 pages; cloth.....\$6

### Manual of Qualitative Chemical Analysis.

Translated into the new system and newly revised by Samuel W. Johnson, M. A. Ninth edition. By DR. C. R. PRESENTUS. 500 pages; cloth.....\$4

### Quantitative Chemical Analysis by Electrolysis According to Original Methods.

Authorized translation from the German of Dr. Alex. Classen. By PROF. WM HALE HERRICK. Teaching electrolytic methods, useful in laboratories for research, and in technical laboratories, especially those connected with metallurgical works. Cloth \$2.50

### The Blowpipe in Chemistry, Mineralogy, and Geology.

Containing all known methods of anhydrous analysis, many working examples, and instructions for making apparatus. By LIEUT. COLONEL W. A. ROSS, R.A., F.G.S. With 120 illustrations; 214 pages; cloth.....\$2

### The Art of Electrolytic Separation of Metals.

Theoretical and Practical. By G. GORE. Fully illustrated; 8vo, cloth.....\$3.50

### A Text Book of Assaying;

for the use of students, mine managers, assayers, &c. By J. J. and S. C. BERTNER; 400 page diagrams; cloth.....\$3.25

### Exercises in Quantitative Chemical Analysis.

With a short treatise on gas analysis. By W. DITTMAR.....\$4.25

### The Chemistry of Iron and Steel Making, and of their Practical Uses.

Written with the object of supplying to the producers and distributors of iron and steel, and to engineers, shipbuilders, architects and others concerned in the use of these important materials, the special scientific knowledge which they all should possess in simple, clear and readable language, the inevitable technicalities being explained as they occur. By U. MATTHEW WILLIAMS, F.C.S., F.R.A.S. Crown 8vo, cloth extra.....\$3

Any book published sent, postpaid, on receipt of price, by

**DAVID WILLIAMS,**

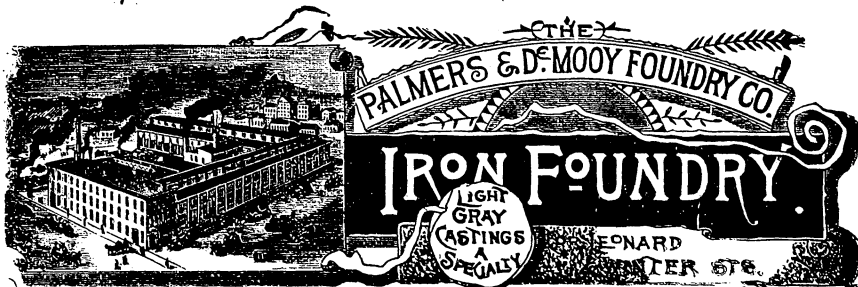
*Publisher and Bookseller,*

96-102 Reade Street, New York

# MALLEABLE IRON CASTINGS TO ORDER:

We Carry a Full Line of WAGON HARDWARE

NORTHWESTERN MALLEABLE IRON CO. MILWAUKEE, WIS.



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. Metal Patterns designed and made. Also Japanning and Galvanizing.

CLEVELAND, O.

## STEEL CASTINGS

### From 1-4 to 15,000 lb. Weight.

True to pattern, sound, solid, free from blow holes, and of great strength. Stronger and more durable than iron forgings, in any position or for any service whatever.

60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel now running prove this.

Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives.

STEEL CASTINGS of every description.

Send for Circulars and Prices to

**CHESTER STEEL CASTINGS CO.,**

Works: Chester, Pa.

Office: 407 Library St., Phila., Pa.

**THE ROBINSON-REA MFG. CO.,**

PITTSBURGH, PA.

**SAND AND CHILLED ROLLS. TIN PLATE PLANTS COMPLETE.**

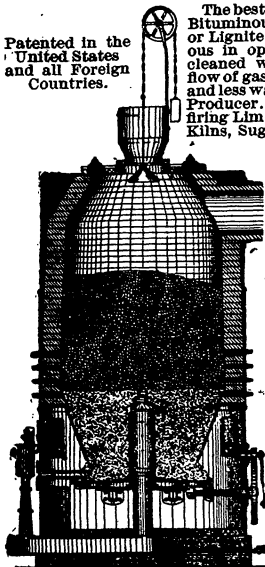
(No 5.)

**R. D. Wood & Co.** 400 Chestnut St.,  
PHILADELPHIA.

SOLE MAKERS OF THE

**TAYLOR REVOLVING-BOTTOM  
GAS PRODUCER.**

Patented in the  
United States  
and all Foreign  
Countries.



The best Producer for either  
Bituminous or Anthracite coal  
or Lignite; absolutely continu-  
ous in operation, as the fire is  
cleaned without stopping the  
flow of gas. Less labor required  
and less waste than in any other  
Producer. Producer Gas for  
firing Lime, Brick and Pottery  
Kilns, Sugar-house Char Kilns,  
Boilers, etc.  
Also applicable to  
all Regenerative  
Furnaces.  
Send for Pamphlet.

**CAST IRON  
PIPE**

MATHEWS'  
FIRE HYDRANTS  
EDDY VALVES,  
VALVE  
INDICATOR POSTS.

Heavy Loam Castings,  
Special Machinery.

Water Power Pumps  
and  
TURBINES.

HYDRAULIC JIB and TRAVELING CRANES,  
FREIGHT and CAR LIFTS, Etc.  
GAS HOLDERS and GAS MACHINERY.

**DROP-FORGINGS**

—AND—

**DIES TO ORDER.**

First Class Work.

THE HERBRAND CO., - FREMONT, O.

**S. CHENEY & SON,**  
**GRAY IRON CASTINGS,**

CHEAP HEATING STOVES,  
DIAMOND THIMBLES,

MANLIUS N. Y.

**DONALDSON IRON COMPANY,**  
MANUFACTURERS OF



**CAST IRON PIPE**  
And Special Castings for Water and Gas. Also Flange Pipe  
Emaus, Lehigh Co., Pa.

**Practical Blacksmithing**

Vols. I, II, III and IV.

5½ x 7½; cloth; per vol. .... \$1.

This work consists of a collection  
of articles contributed at different  
times by skilled workmen to the  
columns of the *Blacksmith and  
Wheelwright*, and covers nearly the  
whole range of blacksmith work,  
from the simplest jobs to the most  
complex forgings.

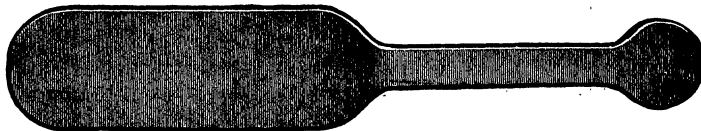
Sent, postpaid, on receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade St., New York.

**WYMAN & GORDON, Worcester, Mass.**

DROP



FORGINGS.

**HAIGHT & CLARK, IRON AND BRASS FOUNDERS, ALBANY, N. Y.**  
WE MAKE TO ORDER

**GRAY IRON, BRASS, COMPOSITION and ALUMI-  
NUM BRONZE CASTINGS** of the very best quality.

Very much time saved by using clean and soft castings. We use only the best material. A trial will con-  
vince you. PICKETS and ROSETTES for Wire Workers. Catalogue of same. NICKEL PLAT-  
ING and JAPANNING, also METAL PATTERN MAKING. We invite correspondence.

**THE CHICAGO FOUNDRY CO.**  
CHICAGO  
RAIL BEAM ROLLS STRUCTURAL BAR  
W.V. FLINN, Pres & Treas. H.A. KEITH V. Pres. W.M. DOWNS Secy.

**J. S. SPENCER'S SONS, Guilford, Conn.,**

—MAKE TO ORDER—

**FINE GRAY IRON CASTINGS** OF BEST MATERIAL AND  
SOUND and Smooth BRASS and COMPOSITION CASTINGS and  
WORKMANSHIP.  
HARDWARE.

SAMPLES SOLICITED FOR ESTIMATES.

**DROP FORGINGS**

Of Every Description, in Iron, Steel, Copper  
and Aluminum.

Holst Hooks, Shafting Collars, Eye Bolts, Wrenches, Machine  
Handles, Fence Ornaments.

SPECIAL ATTENTION GIVEN TO THE MANUFACTURE OF  
**SPECIAL FORGINGS.**

**PHILADELPHIA DROP FORGE COMPANY,**

Office and Works, S. E. Cor. American and York Sts., Philadelphia.



**THE JOHNSON FOUNDRY CO.,**  
JOHNSTOWN, PA.

**CHILLED AND SAND ROLLS.**  
GENERAL CASTINGS.

**STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO.**

—HEADQUARTERS FOR—

**LIGHT GRAY IRON CASTINGS.**

—UNEQUALED IN—

**SOFTNESS and SUPERIOR FINISH.**

Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can  
please you. Send samples for prices.

**PAGE, NEWELL & CO.,**

139 MILK ST., BOSTON,

**IRON, STEEL AND METAL MERCHANTS.**

IMPORTERS OF

**SWEDISH IRON**

Charcoal, Siemens-Martin & Bessemer Productions.

BARS, SHAPES, RODS, SHEETS, BILLETS, BLOOMS.

Deliveries made at all prominent American, Canadian and Provincial Ports

**WILHELM & CO.,**

Telegram Building, ROOMS, 15, 16, 17 & 18,  
HARRISBURG, PA.

Iron Ore, Pig Iron, Boiler Plates, Nails,  
Steel Rails, Coke, Bituminous Coal.

Telephone, No. 1503.  
Western Union and Postal Telegraph Wires in Office.  
Cable Address, "WILHELM."

**W. WALLACE CHRISTIE, M. E.,**  
**Consulting :- Mechanical  
Engineer.**

Inspector of Bridge Construction.  
ENGINE AND BOILER TESTS, TESTING MATERIAL,  
COAL HANDLING MACHINERY.  
Paterson Nat' Bank Bldg., Paterson, N. J.

# THE GALLOWAY BOILER.

Safety, Maximum Economy in Fuel, Lowest Cost of Maintenance.  
Greatest Durability, Large Steam and Water Spaces.

*Are the Advantages Offered by this Boiler.*

SPECIFICATIONS AND PRICES UPON APPLICATION TO

## EDGE MOOR IRON COMPANY,

Post Office, Wilmington, Delaware.

WILLIAM SELLERS, Pres't. JOHN SELLERS, Jr., Vice-Pres't. H. B. BRADFORD, Supt.  
WM. F. SELLERS, Secretary. WILLIAM H. CONNELL, Treasurer.  
F. W. HEISLER, Purchasing Agent.



### BRASS and BRONZE CASTINGS TO ORDER.

Nickel and Brass Plating.  
Light Machinery and Machine Work.  
Bronzing and Japanning.

Estimates given and contracts taken for the manufacture of Specialties and Brass Goods.  
Correspondence solicited.

C. H. ANGUS, Pleasant St., Albany, N. Y.

### The Trenton Malleable Iron Company.

#### MALLEABLE CASTINGS

Made from Refined Air Furnace Iron.

SPECIALTIES: Malleable Iron Castings, Car Couplers, R. R. Supplies, Street Car R. R. Supplies, Car Replacers, Malleable Iron Castings for Contract Work, Frog and Switch Castings, Castings—Light and Heavy, Journal Box Castings, Car Trimmings.

Prices given upon receipt of Patterns or Sample Castings.

Trenton, . . . . . New Jersey.

## STEEL CASTINGS

OPEN HEARTH AND CRUCIBLE

### The Congdon Brake Shoe Co.

OFFICES AND FOUNDRIES: CHICAGO, ILL.

## BRAKE SHOES

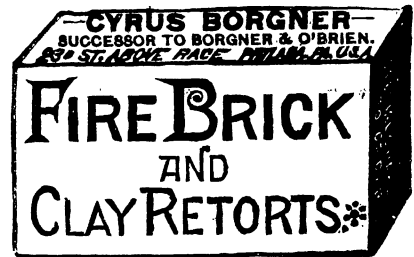
STAY-BOLT,  
RIVET, D. LINK,  
AXE, HATCHET,  
CARRIAGE AND  
WAGON AXLE  
**IRON.**

SUPERIOR QUALITY REFINED BAR IRON,  
"VULCAN" AND "LOCKHART" BRANDS.



SMALL CHANNELS AND ANGLES,  
HEXAGON IRON AND STEEL.

ALL  
MERCHANT BAR  
SIZES  
OF  
SOFT  
**STEEL.**



ESTABLISHED 1864.

### JAMES GARDNER & SON;

MANUFACTURERS OF

### "STANDARD SAVAGE" FIRE BRICK TILE and FURNACE BLOCKS

OF ALL SHAPES AND SIZES.

WORKS, Ellerslie, Allegheny Co., Md.  
OFFICE, Cumberland, Md.; P. O. Box 540.

S. M. Hamilton & Co., Agents, - Baltimore, Md.  
Stowe, Fuller & Co., Agents, - Cleveland, O.

Established 1848.

### OSTRANDER FIRE BRICK CO.

Manufacturers of

### FIRE BRICK

FOR ALL PURPOSES

TROY, N. Y.

ESTABLISHED 1856.

### HENRY MAURER & SON,

MANUFACTURERS OF

### FIRE BRICK

of all Shapes and Sizes,

420 E. 23d St. New York.

### B. KREISCHER & SONS,

## FIRE BRICK

BEST AND CHEAPEST,

ESTABLISHED 1845.

Office, foot of Houston Street, East River, NEW YORK.

### UNION MINING COMPANY MOUNT SAVAGE FIRE BRICK.

Agent for Eastern Penna., West New Jersey and Delaware  
EDWARD J. ETTING,  
222 South Third St., Philadelphia, Pa.

### RENOVO FIRE BRICK & CLAY CO., Limited,

MANUFACTURERS OF

### Highest Grades of FIRE BRICK,

Suitable for any purpose when a refractory brick is required.

Works: Renovo, Pa.

Office: 420 Walnut St., Philadelphia, Pa.

### HIGH Presbrey Stove Lining Co.,

### GRADE TAUNTON, MASS.

### FIRE BRICK for all purposes.

### FRANCIS WISTER, COMMISSION MERCHANT, COKE, COAL, ORES.

National Foundry Coke a Specialty.  
Sulphur less than 0.5.  
All sizes: National Crushed Coke.  
Bullitt Building, PHILADELPHIA.

# MAHONING FOUNDRY & MACHINE SHOP,

BUILDERS OF

## Blast Furnaces, Rolling Mill and Mining Machinery,

### ROTARY SQUEEZERS, ORE CRUSHERS, ROLL TRAINS, SHEARS, IRON TRUCKS, &c.

Makers of Castings of all descriptions for cable and electric railroads, building fronts, columns, etc. Address

**FRANK JAMESON, Manager, Danville, Pa.**

**EXHAUST TUMBLERS,**  
Hexagon, Round or Wooden  
BEST AND CHEAPEST.

**WM. A. SWEETSER**  
29 Montello St., Brockton, Mass.

**Frank C. Roberts & Co.,**  
CIVIL ENGINEERS.

Blast Furnaces, Steel Works, Rolling Mills, Iron and Steel Bridges and Buildings, Factory and Warehouse Construction.

OFFICES:

S. E. Cor. 4th and Chestnut Sts., Philadelphia, Pa.

**Patent Tumbling Barrels.**

MANY VARIETIES

For all Kinds of Work.

Send for new Catalogue.

**HENDERSON BROS.,** Waterbury, Conn.

**PIERSON & CO.,**  
—DEALERS IN—

**IRON and STEEL**

OF EVERY DESCRIPTION,

24 to 27 West St., cor. Morris,  
NEW YORK.

**STEEL CASTINGS,**

True and Solid.

MACHINERY WORK A SPECIALTY.

Correspondence Solicited.

**New Castle Steel Casting Co.,**  
NEW CASTLE, PA.

**HENRY AIKEN,**

**Consulting Mechanical Engineer**

Rooms 508 and 509, Lewis Building,

PITTSBURGH, PA.

**GRAM CURTIS,**

**Consulting Mechanical Engineer**

Bessemer and Open Hearth Steel Works,  
Rolling Mills, Iron Buildings,  
Heavy Machinery.

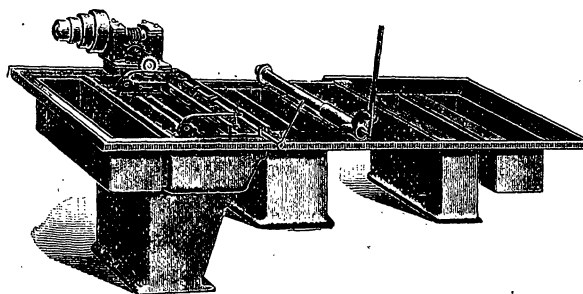
Rooms 612 and 613 Lewis Block,  
PITTSBURGH, PA.

**OPEN HEARTH STEEL CASTINGS**  
OF BEST QUALITY  
SOLID AND FREE FROM BLOW HOLES  
EQUAL TO THE BEST STEEL FORGINGS  
CASTINGS OF EVERY VARIETY UP TO 25 TONS WEIGHT  
ADDRESS: NORRISTOWN STEEL CASTING CO., NORRISTOWN, PA.

**THE LLOYD BOOTH CO.,**

**YOUNGSTOWN, OHIO.**

Tinning  
MACHINERY.



Rolling Mills,  
Sand and Chill  
ROLLS.

**FRANKFORD STEEL COMPANY**

FRANKFORD, PHILA., PA.

**Steel Railroad and Machine Forgings,**

SOLID CRUCIBLE STEEL CASTINGS

AND

**Best Grades of Tool and Machinery Steel.**

GEORGE MESTA, Prest.

W. D. ROWAN, Sec.

J. O. HORNING, Treas.

**LEECHBURG FOUNDRY & MACHINE CO.,**

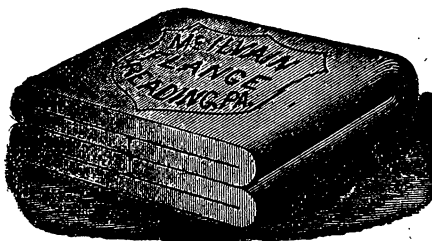
Office: LEWIS BLOCK, Pittsburgh, Pa.

Sheet and Bar Mills, Shears, Squeezers and Roll-Lathes.

**ROLLS.** MESTA'S PATENT PICKLING MACHINES AND TIN  
PLATE MACHINERY.

ESTIMATES GIVEN ON COMPLETE TIN PLATE PLANTS.

TENSILE } 56,000 to 64,000 lbs.  
STRAIN. }



CAPACITY. { Plates 1 inch thick to No. 12.  
30 feet long.  
70 inches wide.

**WM. McILVAIN & SONS,**

READING, PA.,

MANUFACTURERS OF

**IRON AND STEEL**

**BOILER PLATES.**

Locomotive, Fire Box, Flange, Shell,  
Tank Iron and Steel, including Plates for  
Bridges, Girders, Stacks, Pipe and Fire  
and Burglar-proof Safes.

**SHILLING FOUNDRY CO., COLUMBUS, O.**

**GRAY  
IRON CASTINGS**

MADE TO  
ORDER. SEND  
SAMPLES FOR  
PRICES.

Do You  
Want Nice,  
Bright, Smooth  
Castings?

If so, order all

Foundry Facings,  
Foundry Supplies,  
Foundry Equipments,  
East India Plumbago  
and Silver Lead from

The S. OBERMAYER CO., Cincinnati, O.

The Largest Foundry Supply House in the World. Write for our Catalogue.

**Foundry  
Facings**

**Foundry  
Supplies**

MANUFACTURERS,

**J. W. PAXSON & CO.**

Philadelphia, Pa.

GROUND SILICA ROCK,  
FIRE BRICK,  
FOUNDRY LADLES,  
TUMBLING BARRELS.

CORE-COMPOUND.

**PEERLESS FACING MILLS.**

**Foundry Facings, Blackings and Foundry Supplies.  
Iron and Brass Foundries Completely Equipped.**

**DIRECT IMPORTERS and REFINERS of GRAPHITE, SILVER  
LEADS or PLUMBAGO.**

No Charge for Trial Samples.

Send for Illustrated Catalogue and Price-List.

**THE CHICAGO FOUNDRY SUPPLY CO., CHICAGO, ILL.**

**WHITEHEAD BROTHERS COMPANY,**

WORKS AT

DEALERS IN

CHEESQUAKE CREEK, N. J.  
SOUTH RIVER, N. J.  
RANTAN RIVER, N. J.  
SOUTH AMBOY, N. J.  
WAREHAM, MASS.  
CENTRE ISLAND, L. I.  
WATERFORD, N. Y.  
ALBANY, N. Y.

CEDAR HILL, N. Y.  
COXSACKIE, N. Y.  
CLINTON POINT, N. Y.  
ATHENS, N. Y.  
COEYMANS, N. Y.  
WILLOW SPRINGS, N. Y.  
POUGHKEEPSIE, N. Y.  
CRESCENT, N. Y.

**Moulding Sand, Fire Sand, Philadelphia Sand, French  
Sand, Fire Clay, Kaolin and Foundry Facings and  
Supplies of all kinds. Lead Facings a specialty.**

517 West Fifteenth St., - - - New York.

TO MAKE BRIGHT SMOOTH CASTINGS USE  
**RADIANT** FACINGS  
AND  
BLACKINGS  
MANUFACTURED BY  
THE J.D. SMITH FOUNDRY SUPPLY CO.  
CINCINNATI, O.  
U.S.A.



**IRON CHIMNEYS**

For all Plants

USING

**POWER**

ANY SIZE AND  
HEIGHT.

**COST LESS**

AND ARE

**STRONGER**

AND MORE

**DURABLE**

THAN

Brick Chimneys.

Prices on application.

**Philadelphia Engineering Works, Ltd.**

Mifflin and Meadow Sts., Philadelphia, Pa.

Western Branch:

PHOENIX BLDG.,

CHICAGO, ILL.

**WESTERN FOUNDRYMEN, SAVE TIME, MAKE MONEY.**  
Order Facings and Foundry Supplies from  
The MacKellar Foundry Facing & Supply Co. Quincy, Ill.

**ECONOMICAL**  
**DETROIT GRAPHITE MFG. CO.**  
**GRAPHITE PAINT**  
**DETROIT, MICHIGAN.**  
**SEND FOR CIRCULARS.**

**BOOKS**

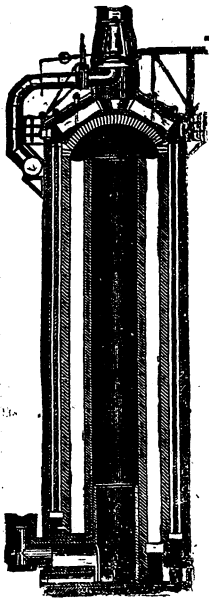
THE NEWEST BOOKS ON Metal Working, Iron, Steel and Metallurgy; Mining, Mechanical and Civil Engineering; Casting and Foundry; Electricity and Electric Lighting; Draftsmanship Architecture and Building, promptly supplied on receipt of price. **SEND FOR CATALOGUES**, mentioning the kind of book you are looking for.

DAVID WILLIAMS, 96-102 Reade St., New York

**VULCAN IRON WORKS**  
**CHICAGO**  
**PILE DRIVERS**

## McCLURE, AMSLER & CO.

Engineers and  
Contractors



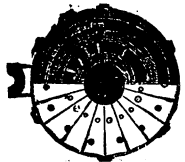
Bissell Block,  
PITTSBURGH, PA.

Blast Furnace  
Construction  
A SPECIALTY.

Sole Agents for  
MASSICK'S & CROOKE'S  
PATENT

Fire Brick  
Stoves,

Designs and Estimates  
for the construction of  
Blast Furnace Work,  
and for all kinds of Hot  
Blast Fire Brick or Pipe  
Stoves; and all other kinds  
of Brick Work pertaining  
to Steel Plants, Iron, Brick  
or Wooden Buildings, all  
kinds of Iron Construction  
in general.



We propose to put into successful  
operation all the plants we design and  
contract for.

## The Iron-Masters' LABORATORY

Exclusively for the

Analysis of Ores of Iron Pig and Manu-  
factured Iron, Steels, Limestone, Clays,  
Slags and Coal for Practical  
Metallurgical Purposes.

Branch Office, 339 Walnut St., Philadelphia.

All Analytical Work at Warrenton, Virginia.

J. BLODGET BRITTON

This laboratory was established in 1886, at the  
instance of a number of practical Iron Masters,  
expressly to afford prompt and reliable infor-  
mation upon the chemical composition of the  
substances above mentioned, for smelting and  
refining purposes, the object being to make it  
at once a convenient, practically useful, and  
comparatively inexpensive adjunct to the Fur-  
nace, Forge and Rolling Mill.

## Artificial Gas Engineering Co., Consulting and Contracting ENGINEERS.

ARTIFICIAL GAS applied to all Branches  
of Manufacturing and Domestic Uses.  
Apparatus for the Manufacture of  
Coal-Gas Furnished at Lowest Prices.

706 TIMES BUILDING,  
PITTSBURGH, PA.

James Hemphill, President. Tho's B. Riter, Vice President. Wm. H. Conley, Treasurer. Jno. F. Wilcox, Gen'l. Manager.

## Pittsburgh Iron & Steel Engineering Co.

BRIDGES, GIRDERS, IRON BUILDINGS.

LEWIS BLOCK Pittsburgh, Pa. USA

## BESSEMER & OPEN HEARTH STEEL PLANTS.

ROLLING MILLS (BLOOMING, RAIL-PLATE &c)

BLAST FURNACES. ENGINES. BOILERS.

WORKS BUILT COMPLETE AND FULLY EQUIPPED FOR OPERATING.

## THE D. R. LEAN COMPANY ENGINEERS and CONTRACTORS,

Penn Building, Pittsburgh, Pa.

Blast Furnace and Steel Plant construction. Regenerative  
Gas Furnaces and Gas Producers.  
Sole Agents **FORD & MONCUR'S** Fire Brick Stove, Machinery  
and Castings, Iron Buildings, &c.

## WILKIE, BOTHWELL & CO., Ltd.

Engineers and Contractors. Blast Furnaces and Steel Works.

We make a specialty of Repair Work, and can furnish a full line of Valves and Fittings  
for Whitwell and Cowper-Kennedy Stoves.

606 Times Building, Pittsburgh, Pa.

## COLD DRAWN STEEL SEAMLESS TUBING



From  $\frac{3}{8}$  to  $1\frac{3}{4}$  inches in diameter and from  
No. 8 gauge to 24 and upwards. Made from  
the best quality of steel, guaranteed perfect  
and to stand the severest tests. Reasonable in  
price. Address, for samples and prices,

SHELBY, OHIO.

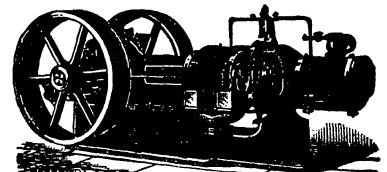
## HARRISBURG Foundry and Machine WORKS

General Office and Works: HARRISBURG, PA., U. S. A.

THE HARRISBURG  
Ideal Tandem Compound Engine.

SUPERIOR REGULATION.  
PERFECT EQUILIBRIUM IN ACTION.  
HIGHEST ECONOMY.

W. R. FLEMING & CO.,  
Mail and Ex. Build'g, N.



PHILADELPHIA AGENCY,  
24 S. 7th St., Build. Ex., Phila.

Operated entirely by one handle.

## BUFFALO AUTOMATIC INJECTOR

A GRADING INJECTOR.

Construction and operation is such that water supply is always  
in proportion to supply of steam admitted and can  
be graded to feed continuously with steam from 20  
to 140 pounds. Works perfectly whether lifting or  
taking supply from city pressure. Operated en-  
tirely by one handle, both in stopping and starting  
and grading supply of steam and water.

No Valves in either steam or suction pipes.

EAGLE EJECTORS, DUPLEX FLUE SCRAPERS, FELTSCHAUEN GAUGE  
COCKS, IMPROVED GLASS OIL CUPS AND LUBRICATORS, CYLINDER OIL  
PUMPS, COMPRESSION GREASE CUPS, Etc. Send for Catalogue. Mention  
this Paper.

SHERWOOD MFG. CO., Buffalo, N. Y.



**THE S. R. SMYTHE COMPANY, INCORPORATED.**

LEWIS BLOCK, ENGINEERS AND CONTRACTORS. PITTSBURGH, PA.

**Regenerative Gas Furnaces and Gas Producers  
For All Purposes.**

TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and satisfactory operation of same.

**OVER 100 PLANTS IN SUCCESSFUL OPERATION.****JULIAN KENNEDY.****Consulting and Contracting Engineer,**

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills.

**STEAM AND HYDRAULIC MACHINERY, &c.**

—Branch Office of The Latrobe Steel Works.—

**Wm. Swindell & Bros.,**

ENGINEERS AND CONTRACTORS,

Regenerative and Recuperative Gas Furnaces for  
Steel, Iron and Glass.**SWINDELL'S IMPROVED GAS PRODUCERS,**

243 BUILT SINCE APRIL 1, 1891.

P. O. Box 945.

548 Smithfield St., Pittsburgh, Pa.

**ALEX LAUGHLIN & CO.,**  
Lewis Block, Pittsburgh, Pa.**GAS HEATING  
GAS PUDDLING  
GLASS MELTING FURNACES**And Artificial Gas Producers of every description for  
Rolling Mills, Steel and Tube Works.

We guarantee to place all plants erected by us in successful operation.

**J. A. HERRICK, M. E.,**Consulting Engineer and Contractor.  
Room 609, 284 Pearl Street, NEW YORK.**STEEL CASTING PLANTS A SPECIALTY.**

Melting and Heating Furnaces of ALL KINDS.

Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.  
New CONTINUOUS Gas PRODUCERS.**HENRY J. CARTEN,**

ENGINEER AND CONTRACTOR,

**REGENERATIVE GAS FURNACES AND ARTIFICIAL GAS PRODUCERS,**

Room 15, Stevenson Building, Pittsburgh, Pa.,

Special attention given to Gas producer plants not working satisfactorily.

**CORRESPONDENCE SOLICITED.****OIL WELL SUPPLY COMPANY**

OWNERS OF THE

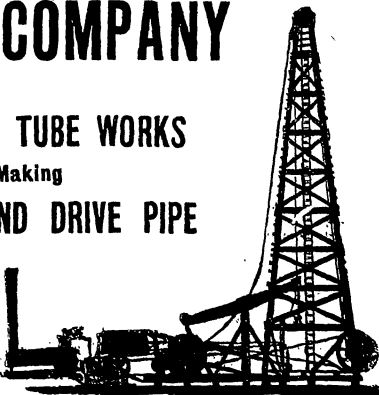
**ELBA IRON WORKS, CONTINENTAL TUBE WORKS**

And Six Other Manufactories Making

**WROUGHT IRON STEAM, LINE AND DRIVE PIPE**Tubing, Casing, Boilers, Engines, Drilling Rigs,  
Tools, Rope,And all other appliances necessary for drilling Oil, Gas  
and Water ARTESIAN WELLS.

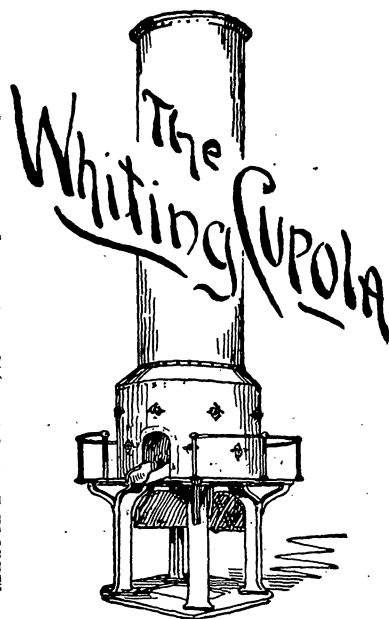
PITTSBURGH, OIL CITY AND BRADFORD, PA.

Also 32 CORTLANDT STREET, NEW YORK



Detroit Foundry Equipment Co., DETROIT, MICH.

MANUFACTURERS OF



Made in Twelve Sizes, 1/2 to 20 Tons per hour Capacities.

The Best Cupola Made. The Most Economical in Use.

**Cranes, Ladles.**

Complete Foundry Outfits.

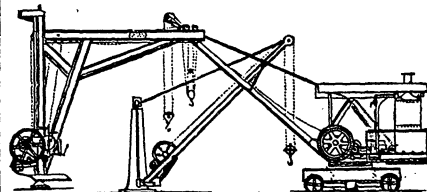
**VICTOR COLLIAU,**

Sole builder of his

New and Improved Patented

**HOT-BLAST  
Colliau Cupola,**287 Jefferson Ave.,  
DETROIT, MICHIGAN,  
U. S. A.**THE ALLENTOWN ROLLING MILLS,**

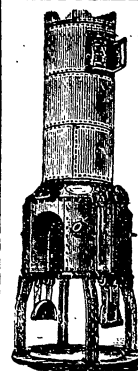
MANUFACTURERS OF

**Cranes, Derricks, Etc.,****ALLENTOWN, PA.**

THE COLLIAU PATENT

**Cupola Furnace**Melting capacity of output  
for the year 1892,**824,442  
NET TONS.**

Correspondence Solicited.

**BYRAM & COMPANY,**Exclusive Manufacturers,  
DETROIT, MICH.

An Introduction to the Study of Metallurgy  
By W. C. ROBERTS-AUSTEN, C. B., F. R. S.,  
Associate of the Royal School of Mines, Chemist  
and Assayer of the Royal Mint, Professor of Metal-  
lurgy in the Royal College of Science, with which  
the Royal School of Mines is incorporated. CON-  
TENTS: Physical properties of metals; alloys; the  
thermal treatment of metals; fuel; materials and  
products of metallurgical processes; furnaces;  
means of supplying air to furnaces; typical metal-  
lurgical processes; economic considerations. With  
numerous diagrams, 292 pages, cloth.....\$2.50  
For sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.

**ZUCKER & LEVETT CHEMICAL CO.,**

10, 12 &amp; 14 Grand Street,

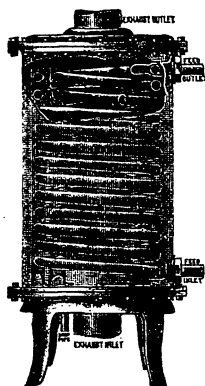
New York, U. S. A.

**NICKEL PLATING OUTFITS,**

Dynamos and Motors for Light, Power and Electro-plating.

Send for Catalogue of  
NICKEL AND ELECTRO-PLATING SUPPLIES AND POLISHING MATERIAL.**THE AERATED FUEL CO.'S SYSTEM**Gives the best oil fire. 200 plants in use, for 50 varieties of work. Forging and tempering a specialty. Send for catalogue to  
W. S. COLLINS, 45 and 46 Drexel Bldg., New York.

GILBERT &amp; BARKER MFG. CO., General Agents for the U. S., Springfield, Mass.

**The American Feed Water Heater.**

The result of over 14 years' experience in the manufacture of various styles of heaters. We use only best seamless

**COPPER TUBING.**

The construction is such that there are

**NO JOINTS**

inside of the shell, consequently there are

**NO LEAKS.**

Send for Catalogue.

**THE WHITLOCK COIL PIPE CO.,**  
Manufacturers,27 SOUTH STREET,  
ELMWOOD, CONN.

NEW YORK OFFICE,

Mail and Express Building, 164 and 168 Fulton St.,

JNO. J. FINNELL, Manager.

JARVIS ENGINEERING CO.,

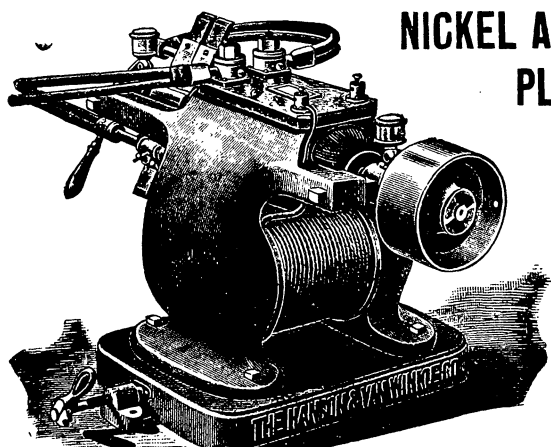
Agents for New England

ESTABLISHED 1820.

INCORPORATED 1891

**The Hanson & Van Winkle Co.,**

MANUFACTURERS OF

**NICKEL AND ELECTRO PLATERS' MATERIAL.**

Nickel-Plating Outfits

From \$20 upward.

**DYNAMO - ELECTRO MACHINES**

For all purposes.

The New H. &amp; V. W. Dynamo Machine.

In sizes from No. 1 to No. 5.

**FROM \$100 TO \$500.**

These machines will be placed on 30 days' trial with responsible parties, and if not satisfactory may be returned at our expense. Guaranteed 30% more powerful than any machine in the market at same price.

219-221 Market St., Newark, N. J.;

81 Liberty St., New York.

85-87 South Canal St., Chicago, Ill.

**WE FURNISH EVERYTHING.****CHAPMAN VALVE MFG. CO.**

Manufacturers of

**VALVES & GATES**

For Water, Steam, Gas, Ammonia, &amp;c.

**GATE FIRE HYDRANTS,**

With and without independent outlets.



We make a specialty of Valves with Bronze seats for High Pressure steam.

Works and General Office,

**INDIAN ORCHARD, MASS.**

Treasurer's Office,

72 Kilby and 112 Milk Streets,

**Boston, Mass.****DYNAMOS**

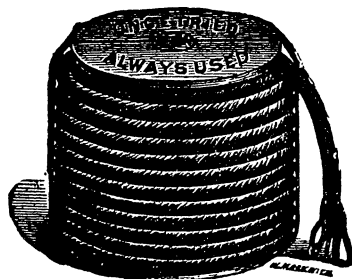
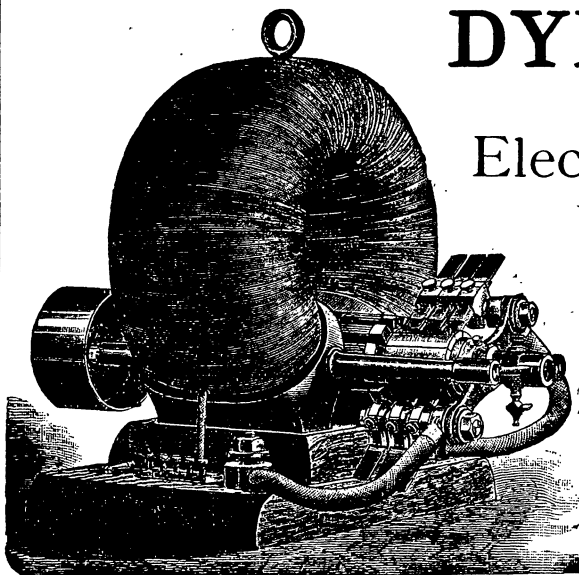
—FOR—

**Electro-Plating.****SIMPLE,****DURABLE and****EFFICIENT.**

The Best Machine Made.

Satisfaction Guaranteed.

—THE—

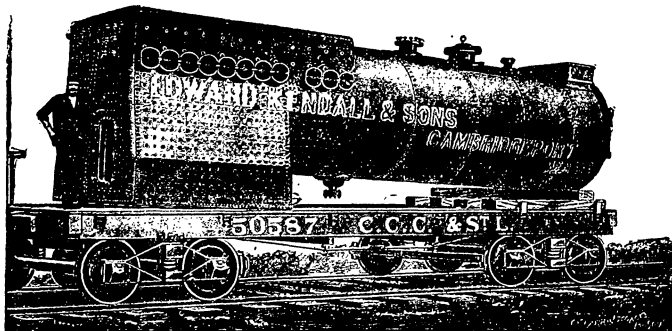
**Eddy Electric Mfg. Co.****Windsor, Conn.**

Send for a Sample of

Morrison's Patent Self-Lubricating Packing,

**ROBT. MORRISON,**

5034 Arsenal St., St. Louis, Mo.

**High Pressure Boilers for Electric Light and Power Plants.**Do not buy before  
corresponding  
with us.



# THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

## Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas

### BOARD OF DIRECTORS:

J. M. ALLEN, President.  
FRANK W. CHENEV, of Cheney Brothers Silk Manufacturing Co.  
CHARLES M. BEACH, of Beach & Co.  
DANIEL PHILLIPS, of Adams Express Company.  
RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.  
THOMAS O. ENDERS, of the United States Bank.  
LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.  
GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.  
NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.  
HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.  
A. W. JILLSON, late Vice-Prest. Phoenix Fire Insurance Co., Hartford, Conn.  
EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.  
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.  
HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.  
C. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.  
PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.

**HAVE YOU  
EXHAUST STEAM ?  
GOING TO WASTE ?**

Are your FEED WATER HEATERS obtaining the best results, in heating and purifying the feed water for your boilers? Are you heating your buildings with live steam or exhaust?

IF YOU DESIRE TO GET BETTER RESULTS from your present feed water heaters, and to heat your building by exhaust steam, without back pressure upon engines, saving power and water of condensation, together with **GREATER ECONOMY IN FUEL**, send for our catalogues of **Webster Vacuum Feed Water Heater and Purifier**, and **Williams Vacuum System of Steam Heating**, which contains some of the largest plants in the United States as references. We visit plants in any part of the United States, at our expense, furnish our apparatus, which may be attached to your present plant, upon trial, under guarantee.

Patentees, Proprietors and Manufacturers of the Webster Vacuum Feed Water Heater and Purifier.  
SEND FOR CATALOGUE.

**WARREN WEBSTER & CO.,**

Managers and Sole Licensees for the Sale of Patent Rights in the United States.

Main Office and Works, 491 N. 3d St., PHILADELPHIA.

## GLOBE PACKING.

FOR STEAM ENGINES, PISTON RODS,  
MINING PUMPS,  
HYDRAULIC LIFTS, ICE MACHINES, ETC.

None genuine without this TRADE-MARK on the MUSLIN cover.

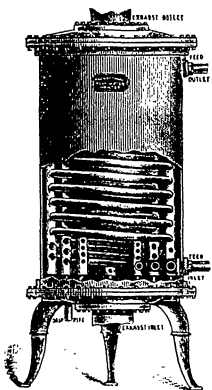


### AGENCIES:

The Burnet Co., New York; W. D. Allen & Co., Chicago; Ensign & McGuffee, San Francisco; T. K. Carey & Bro., Baltimore; Charlotte Supply Co., Charlotte; Waters & Garland, Louisville; Southern R. & Supply Co., Richmond, and others

Ask your supply dealers for it or order from agencies or from makers,

**JAS. H. BILLINGTON & CO.**  
PHILADELPHIA, PA.



## The National Feed Water Heater

is a BRASS COIL HEATER, delivering water to the boilers at 212° Fahrenheit. It is low in price, but unequalled in efficiency. 500,000 H. P. in daily use attests its merits.

Coils and Bends of Iron, Brass, and Copper Pipe.

**THE NATIONAL PIPE BENDING CO.,**

98 River St., New Haven, Conn.



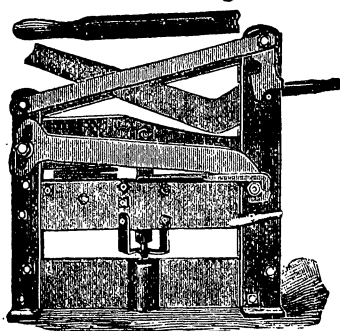
## Patent Wrought Iron Shear AND Punch Combined

For Cutting and Punching Iron and Plow Steel.

This Machine will cut 4 x ½ Flat Iron and 1½ Round or Square, and Punch ¾ hole through ¾ Iron.

—MANUFACTURED BY—

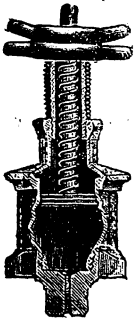
**THE CLEVELAND HARDWARE CO.,**  
CLEVELAND, OHIO.



A Manual of Mining. Based on the course of lectures on mining delivered at the School of Mines of the State of Colorado. By M. C. HILSENG, C.E., E.M., Ph.D., Professor of Engineering, Colorado State School of Mines; formerly of Columbia College School of Mines, New York City. CONTENTS: Geognosy; Preparatory and Explanatory work; Methods of Mining; Hoisting Machinery; Electricity and Water Power; Hoisting operations; Hoisting Conveyances; Underground Traffic; Surface Transportation; Pumping; Ventilation; Methods of Ventilation; Distribution of the Air; Regulation of the Air Current; Illumination; Hygienic Conditions; Shafts; Sinking in Running Ground; Timbering; Drifts, Tunnels and Adits; Boring; Breaking Ground; Blasting; Drills and Drilling; The Compression of Air; Mine Examination. 427 pages, cloth ... \$4.00

Sent, post-paid, on receipt of price, by  
**DAVID WILLIAMS, Publisher and Bookseller,**  
96-102 Reade St., New York

**WADHAM'S OIL AND GREASE CO.,**  
**Milwaukee, Wis.,**  
 Manufacturers of  
**Fine Lubricants and Compression Grease Cups.**



Sole manufacturers of the O'CONNELL GREASER. The most reliable lubricator in existence for the Crank Pin and Cross Head. It saves 50 per cent. of the cost of using oil and effectually prevents hot journals. Special cups made for upright MARINE ENGINES. Write for Descriptive Catalogue and Prices.

The Improved  
**WHARTON - HARRISON**  
**SAFETY BOILER,**

For all Power and Heating Purposes.  
 Single Boilers 2-240 H.-P.  
 Batteries of any Capacity.

**THE COCHRANE**  
**FEEDWATER HEATER.**

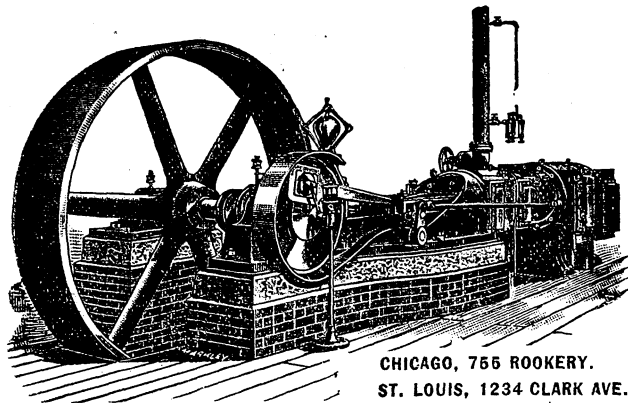
**THE COCHRANE**  
**FEEDWATER HEATER & PURIFIER.**

THE COCHRANE

**SEPARATOR.**

Horizontal or Vertical Form. For Obtaining  
 Dry Steam. Purified Exhaust.

MANUFACTURED BY  
**HARRISON SAFETY BOILER WORKS,**  
 Germantown Junction. PHILADELPHIA, PA.



**SOUTHWARK**  
**FOUNDRY AND**  
**MACHINE CO.,**  
 Philadelphia, Pa.

Sole Makers of

**THE PORTER-ALLEN**  
**AUTOMATIC ENGINE,**  
 SIMPLE, COMPOUND  
 OR TRIPLE EXPANSION.

Also Builders of  
**BLOWING ENGINES,**  
**REVERSING ENGINES,**  
**CENTRIFUGAL PUMPS,**  
**BOILERS, TANKS, ETC.**

CHICAGO, 755 ROOKERY.  
 ST. LOUIS, 1234 CLARK AVE.

**POWER FROM GASOLINE.**

DIRECT FROM THE TANK.

**CHEAPER THAN STEAM.**

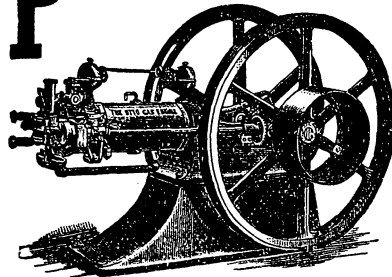
No Boiler. No Steam. No Engineer.

For Use Everywhere.

**OTTO GASOLINE ENGINES,**

**Stationary or Portable.**

1 to 50 H. P. 8 to 20 H. P.



Running Expenses, Less than one cent per horse power per hour.

For large engines, one-half cent per horse power per hour.

Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply.

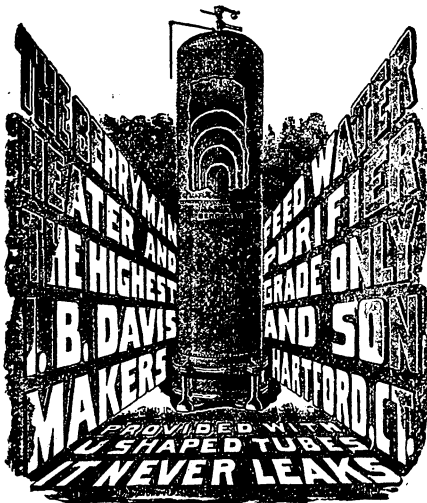
The Best Auxiliary Power for Night Workers

**OTTO GAS ENGINE WORKS,**

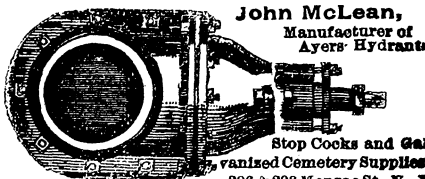
33d and Walnut Sts.,  
 PHILADELPHIA, PA.

CHICAGO OFFICE:  
 151 Monroe St.

BOSTON OFFICE:  
 19 Pearl St.



SEND FOR CATALOGUE "A."

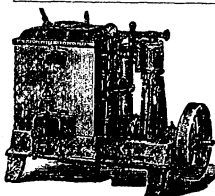
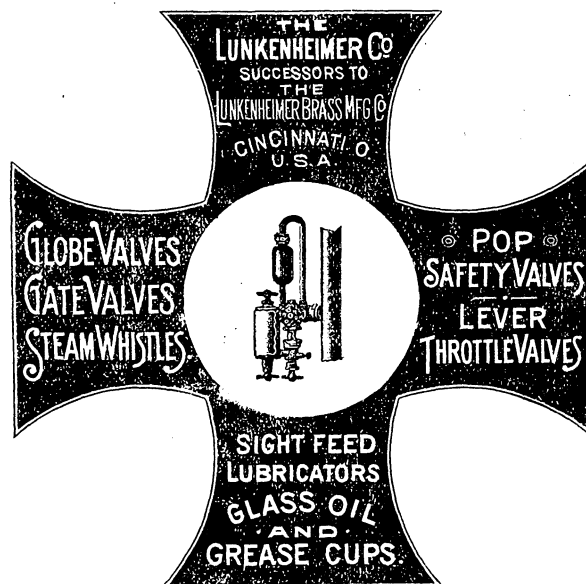


**John McLean,**  
 Manufacturer of  
 Ayers Hydrants

Stop Cocks and Gal  
 vanised Cemetery Supplies.  
 296 & 298 Monroe St., N. Y.

Elements of Machine Design. Notes and plates for the use of students in the Lehigh University. Second edition, revised, constituting a short course in designing the most important of the machine parts that occur in practice, with numerous tables. By Prof. J. F. KLEIN. Cloth.....\$6.00

For Sale by David Williams, 98-102 Reade St., N. Y.



**The Shipman Automatic Steam Engine.**  
 PETROLEUM OR KEROSENE FUEL.

1, 2, 6, 8 Horse-Power, Single.  
 8 and 22 " Compound.

STATIONARY or MARINE.

No SKILLED ENGINEER.

—SEND FOR CATALOGUE.—

**SHIPMAN ENGINE CO.,**

200 Summer St., Boston, Mass.  
 New Orleans, New York, Chicago, San Francisco.

Awarded the Grand Prize at Late Paris Exposition.

SEND FOR THIS BOOK *FREE ON APPLICATION*

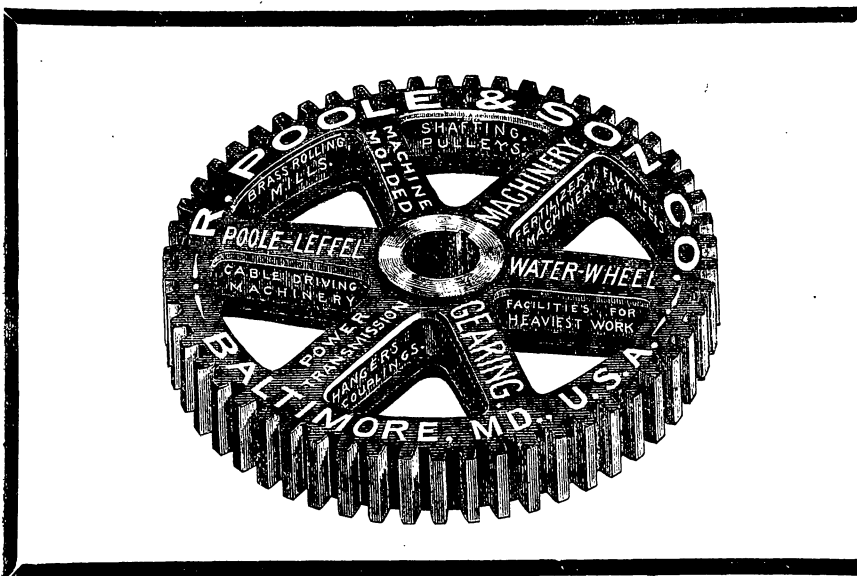
**THE BABCOCK & WILCOX CO. WATER TUBE**

**30 CORTLAND ST. N.Y.**

BOSTON, MASS. 8 OLIVER ST.  
PHILADELPHIA, PA. 32 N. 5TH ST.  
PITTSBURGH, PA. 408 LEWIS BLOCK  
CLEVELAND, O. 412 PERRY-PAYNE BLDG.  
CHICAGO, ILL. 45 S. JEFFERSON ST.  
MINNEAPOLIS, MINN. 604 CORN EX.  
NEW ORLEANS, LA. 57 CARondelet ST.  
HAYAMA, CUBA. 116 CALLE DE LA BARRICA

**STEAM BOILERS**

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.



ROCK DRILLING AND AIR COMPRESSING

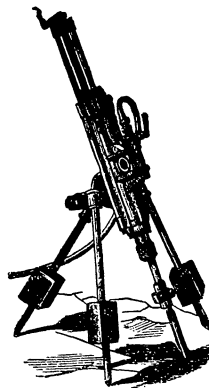
# MACHINERY

—FOR—

TUNNELS, QUARRIES,  
MINES, RAILROADS,

And wherever Ore and Rock are to be Drilled  
and Blasted.

**RAND DRILL CO.,**  
23 Park Place, New York.



Branch Offices: Monadnock Building, Chicago; Ishpeming, Mich.;  
1316 18th Street, Denver; Sherbrooke, P. Q., Canada; Apartado 830,  
Mexico City.

**IRON CASTINGS** of all kinds to order.

Drill Press and **PLANER CHUCKS.**  
UNIVERSAL PORTABLE RADIAL DRILLS. HIGH PRESSURE VERTICAL ENGINES.  
HORIZONTAL STATIONARY ENGINES.

CRANES, Hand and Power, Steam and Hydraulic.  
Diamond Pointed Core **PROSPECTING DRILLS.**  
Can Turn 22 Feet Diameter. **MACHINERY** of all kinds built to order.

**MINERAL LANDS PROSPECTED** and Artesian Wells Bored, by Contract.  
**PENNSYLVANIA DIAMOND DRILL & MANUFACTURING CO. - BIRDSBORO, PA.**  
CHICAGO MACHINERY & ENGINEERING CO., Western Sales Agents. Chicago, Ill.

**CLEVELAND AND HARDWICK**

# ENGINE WORKS.

MANUFACTURERS OF STEAM ENGINES  
and BOILERS.  
ERIE, PENN.

## YOU WANT

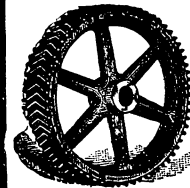
the best gear-wheels obtainable  
in your plant. Your wants are  
filled in every respect by our  
**MACHINE MOLDED**  
gear wheels.

## YOU HAVE

accuracy and wear combined in  
our wheels. Especially wear, as  
they are made from a **SPECIAL**  
**PROCESS** charcoal iron. You  
want further information? Write  
us.

**UNION FOUNDRY & MACHINE CO.,**

Pittsburgh, Pa.



## Architectural Iron and Steel and Its Application in the Con- struction of Buildings.

*Fully Illustrated with Engravings from  
Original Designs.*

### GENERAL CONTENTS:

Chapter I. THE MANUFACTURE OF IRON AND  
STEEL. Articles 1 to 24.  
Chapter II. FLOORS. Articles 25 to 51.  
Chapter III. GIRDERS. Articles 52 to 66.  
Chapter IV. CAST IRON COLUMNS. Articles 67  
to 76.  
Chapter V. TRUSSES. Articles 77 to 90.  
Chapter VI. STRUTS. Articles 91 to 101.  
Chapter VII. CAST IRON COLUMNS. Articles  
102 to 118.  
Chapter VIII. WROUGHT IRON COLUMNS  
Articles 119 to 124.  
Chapter IX. STAIRWAYS. Articles 125 to 139.  
Chapter X. ORNAMENTAL IRON. Articles 140  
to 146.  
Chapter XI. ELEVATOR ENCLOSURES. Articles  
147 to 150.  
Chapter XII. DOORS AND SHUTTERS. Articles  
151 to 160.  
Chapter XIII. FLOOR LIGHTS AND SKYLIGHTS.  
Articles 161 to 165.  
Chapter XIV. HOLLOW BURNT CLAY. Articles  
166 to 167.  
Chapter XV. ANCHORS. Articles 168 to 177.  
Chapter XVI. BOLTS. Articles 178 to 188.  
Chapter XVII. PRACTICAL DETAILS ILLU-  
STRATED. Articles 189 to 239.  
Chapter XVIII. FINISHING IRON. Articles  
240 to 246.  
Chapter XIX. SPECIFICATIONS.  
Chapter XX. TABLES.  
Chapter XXI. SELECTED PAPERS ON IRON  
WORK, FROM THE NEW YORK BUILDING  
LAW, 1891.

By WILLIAM H. BIREMIRE,

8vo Cloth, - - - **\$3.50.**

Any book published will be sent post-paid  
on receipt of price, by

**DAVID WILLIAMS,**

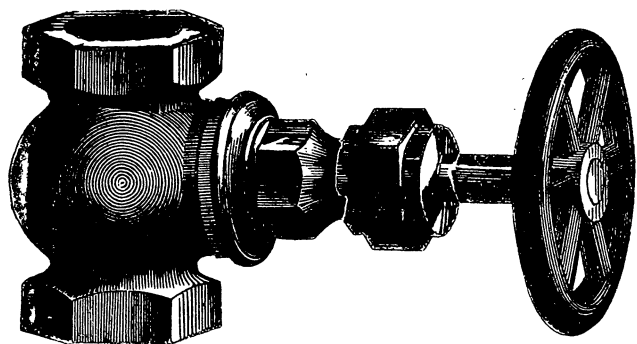
Bookseller and Publisher,

96-102 Reade St., N. Y.

**BLAST FURNACES,  
ROLLING MILLS,  
STEEL WORKS,  
MINES, ETC.,  
ETC.**



**OIL WELLS,  
REFINERIES,  
ELECTRIC LIGHT PLANTS,  
WATER WORKS, ETC.,  
ETC.**



**McNAB & HARLIN MFG. CO.,**

—MANUFACTURERS OF—

**Brass Cocks and Valves**

*For Steam, Water and Gas.*

**Wrought Iron Pipe and Fittings. Plumbers' Materials.**

**SEAMLESS BRASS AND COPPER TUBES.**

**Factory, PATERSON, N. J. - 56 JOHN ST., N. Y.**

Catalogue and Price List will be sent to the Trade with their first order, or by express, if desired before ordering.



**THE CONTINENTAL IRON WORKS.**

West and Calyer Streets, BROOKLYN, N. Y.,

—SOLE MANUFACTURERS OF—

**CORRUGATED FURNACES, FOR MARINE AND LAND BOILERS.**

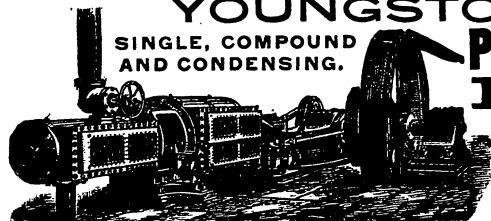
Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Thos. F. Rowland, Pres. Warren E. Hill, Vice-Pres.  
Thos. F. Rowland, Jr., Treas. Chas. H. Corbett,

Take Ferry from East 10th or 23d Streets, N. Y., to Greenpoint.



**WILLIAM TOD & CO.**  
YOUNGSTOWN, OHIO.



SINGLE, COMPOUND  
AND CONDENSING.

**PORTER-HAMILTON  
ENGINE**

Blowing Engines,  
Hydraulic Cranes & Accumulators,  
Heavy Special Machinery.  
ENGINE CATALOGUE ON APPLICATION

**THE LANE & BODLEY CO.,**

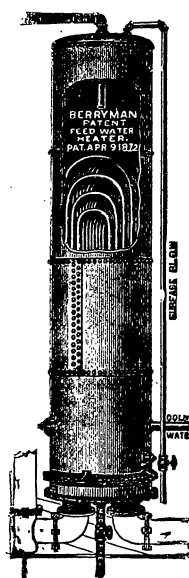
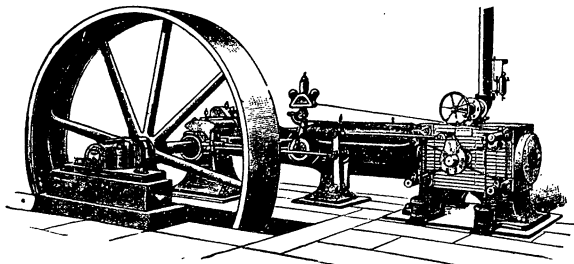
Cincinnati, O.

**ENGINES,**

ALL SIZES

Simple and Compound,  
CORLISS ENGINES A SPECIALTY.

Heavy Slide Valve Engines.  
Shafting, Hangers, Pulleys,  
Belt Elevator, etc.



**The "Berryman"  
Feed Water Heater  
and Purifier.**

It never leaks, and  
hence requires no re-  
pairs.

Over 13,000 in use. Ap-  
ply for Prices, Catalogue  
and Particulars to

**Jas. Berryman, M. E.,**

General Manager,

125 N. 4th Street.

PHILA., PA.

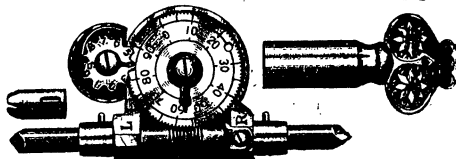
**BOSTON GEAR WORKS.**

37 Hartford St., Boston, Mass.

**HEADQUARTERS FOR GEARS.**

Book on Gears, 170 Illustrations, \$1.00. Job Gear  
Cutting of all kinds. Spur, Bevel, Spiral, Hatchet,  
Worm, Rack, Elliptic, Index Plates, &c. Very small  
or large. Send for 1892 Catalogue; 900 sizes of Gears;  
FREE to any business firm.

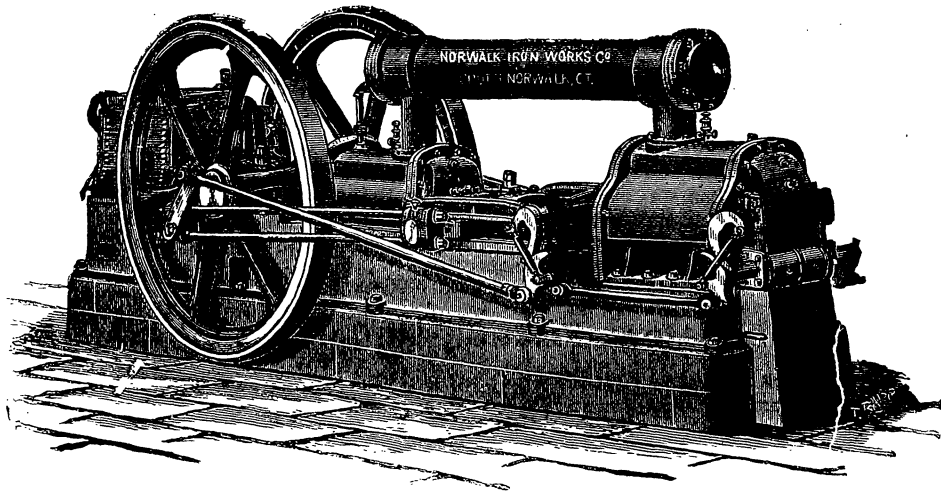
**CHURCH'S DOUBLE AND SINGLE  
SPEED INDICATORS.**



CHURCH & SLEIGHT, 109 FULTON ST., N. Y.



# Air Compressors.



**THE NORWALK IRON WORKS CO., South Norwalk, Conn.**

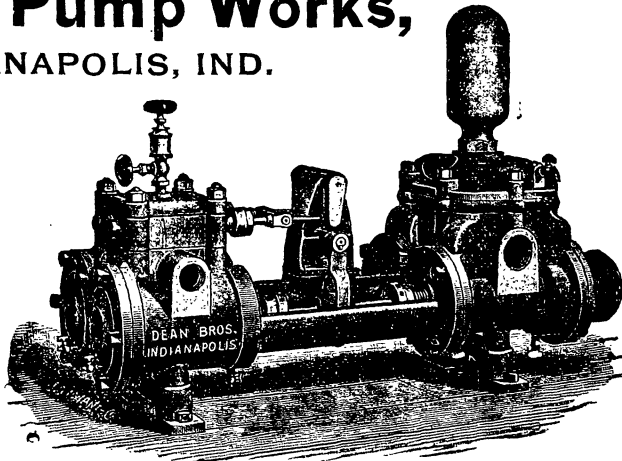
**DEAN BROTHERS**  
**Steam Pump Works,**  
 INDIANAPOLIS, IND.

**DUPLEX PUMPS.**

**SINGLE PUMPS.**

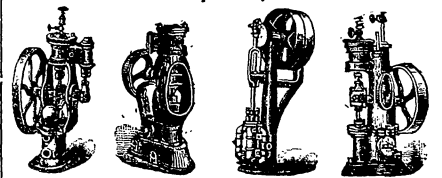
**DEEP WELL  
 PUMPS.**

Send for Catalogue  
 and Prices.

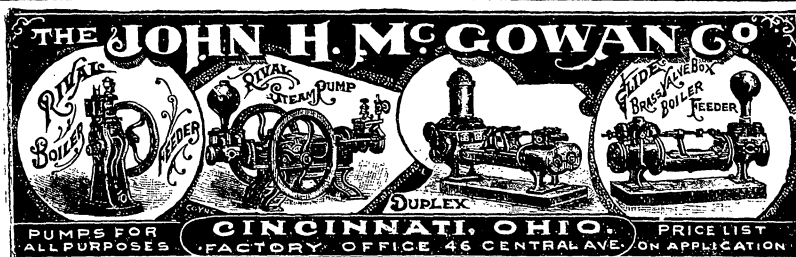


Send  
 for  
 Prices.

**VALLEY PUMP CO.**  
 Easthampton, Mass.



**WELL  
 MACH'Y**  
 All Kinds, Water, Gas, Oil  
 Mining, Ditching, Pumping,  
 Wind and Steam; Heating  
 Boilers, &c. Will pay you  
 to send 25c. for Encyclopedia  
 of 1500 Engravings.  
 The American Well  
 Works, Aurora, Ill.  
 Also Chicago, Ill.;  
 Dallas, Tex.; Syd-  
 ney, N. S. W.



Brass Founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

**Worthington Steam Pumps**  
**CONDENSERS and WATER METERS.**

**HENRY R. WORTHINGTON,**

86 & 88 LIBERTY STREET, NEW YORK.

**BOSTON, ST. LOUIS, PHILADELPHIA, DENVER, CHICAGO,**

**BOOKS.** YOU CAN OBTAIN PROMPTLY the latest  
 work on any subject in which you are  
 interested by addressing **DAVID WILL-**  
**IAMS,** Publisher and Bookseller 96-102 Reade Street, New York.

**CHEAPEST.  
 HANDIEST.  
 SIMPLEST.** **PUMPS.**  
 Handling Dirty, Gritty and Sandy Liquids,  
 without Wear, Oil or Care. Pumping outfits  
 for Contractors, Mining, Irrigating, Railroad,  
 Quarry, Drainage and Manufacturing purposes.  
 Second-hand Engines, Boilers, Pumps, and  
 other Machinery always on hand. Exchanging.  
**MASLINS, 165-167 First St., Jersey City, N.J.**

**SEAMLESS  
 COPPER FLOATS  
 AND  
 AIR CHAMBERS.** Made in all sizes  
 and shapes by a  
 New  
 Process.  
 Guaranteed  
 to stand 50%  
 more pressure than any other make.  
**SEND FOR PRICES.**  
**SPRINGFIELD BRASS CO.,  
 SPRINGFIELD, MASS.**

# The Brown Hoisting and Conveying Machine Co.,

CLEVELAND, OHIO, U. S. A.,

Sole manufacturers of the

## "BROWN HOIST"

A NEW AND COMPLETE SYSTEM FOR HANDLING OF MATERIALS.

The Brown Patent Cable Tramway system.

The Brown Patent Suspended Beam Tramway system.

The Brown Patent Bridge Tramway system.

The Brown Patent Shed Tramway system.

The Brown Patent Furnace Stock Distributer.

The Brown Patent Warehouse Tramway system.

The Brown Patent Sewer Machine Tramway system.

The Brown Patent Continuous Elevated Tramway system.

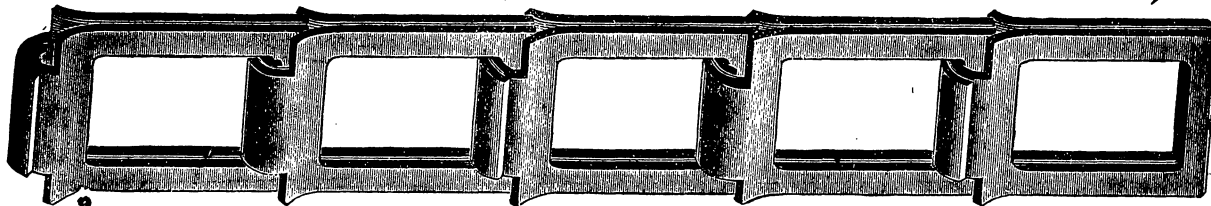
The Fayette-Brown Patent Automatic Furnace Hoist.

### The Brown Patent Friction Clutch Hoisting Engine.

Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

The Most Perfect Clutch.

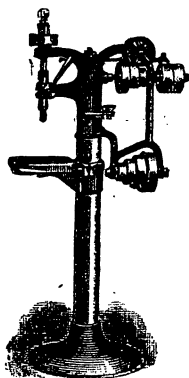
ROBERTS MFG. CO. - - - PITTSBURGH, PA.



PATENT DETACHABLE STEEL LINK BELTING,

Sprocket Wheels and Shafting.

Send for Catalogue and reduced Price-List.



### The Norton Drills

for light, sensitive and rapid drilling. 1, 2, 3, 4 or more spindles, sensitive or automatic feed. To drill from 0 to 1/4-inch holes. The latest and best. Most convenient, sensitive and durable drills on the market. Have balanced spindles and balanced tables. Write for prices and description, or for special machinery.

THE  
NORTON & JONES MACHINE TOOL WORKS,  
PLAINVILLE, CONN

### THE AMERICAN STEAM ENGINEER.

Theoretical and Practical, with examples of the latest and most approved American practice in the design and construction of Steam Engines and Boilers.

For the use of engineers, machinists, boiler-makers and engineering students.

By EMORY EDWARDS M.E.,

author of "A Catechism of the Marine Steam Engine," "Modern American Locomotive Engines," "Modern American Marine Engines, Boilers and Screw Propellers," and "The Practical Steam Engineer's Guide."

Fully illustrated. About 350 pp.

12mo, \$2.50

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS

Publisher and Bookseller,

96-102 Reade St., New York.

### JEFFREY CHAIN BELTING.

Also MALLEABLE, WROUGHT, STEEL AND SPECIAL CHAINS for

Elevating and Conveying Machinery

DRIVE BELTS.

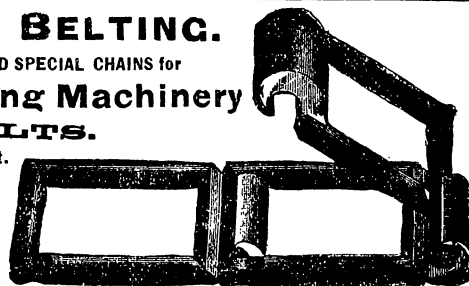
Send for 1893 Catalogue and Reduced Price-List.

THE JEFFREY MANUFACTURING CO.

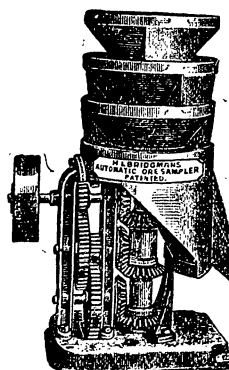
COLUMBUS, OHIO, U. S. A.

Chicago Branch, 48 So. Canal St.

New York Branch, 163 Washington St.



## ALEXANDER BROS BEST OAK BELTING PHILADELPHIA.



### THE H. L. BRIDGMAN PATENT ORE SAMPLING MACHINE

Used by Smelting Works, Sampling Works, and Mills which are up to date.

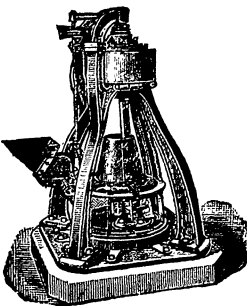
AUTOMATIC IN ACTION. RELIABLE IN RESULTS.

A valuable acquisition to the mining industry. It requires no expert manipulation, and cannot be used to produce misleading samples. This machine furnishes DUPLICATE SAMPLES, and saves the expense of mixing, coning, and quartering. It is the only first-class Ore Sampling Machine built. It illustrates modern science and certainty, while the methods which it displaces are vague and unreliable.

It should be used by Lead, Copper, Zinc and Iron Smelting Works, Concentrating and Leaching Works, Gold and Silver Mills, Sampling Works, Etc. Among the users of this machine are Cia Metalurgica Mexicana, San Luis Potosi, Mexico; Chicago Copper Refining Co., Blue Island, Ill.; Hemenway & Browne, Antofagasta, Chile; Francisco M. Coughlan, Catorce, Mexico.

Investigate it! Your address on a postal card to us will bring you interesting printed matter which will enable you to appreciate the value of the machine.

FRASER & CHALMERS, Sole Manufacturers, CHICAGO, ILL., U. S. A.



## THE GRIFFIN MILL

A perfect pulverizer of all refractory substances by either the wet or dry process. It works better and at less expense than any other Mill, and is conceded to be the only perfect pulverizing Mill manufactured.

For free illustrated pamphlet address

BRADLEY FERTILIZER CO., 92 State St., Boston.

# NEW YORK BELTING & PACKING CO.

JOHN H. CHEEVER,  
Manager.

(LIMITED.)

15 Park Row, New York.

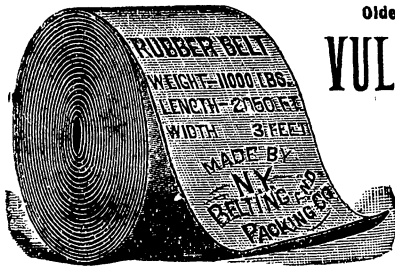
Oldest and Largest Manufacturers in the U. S. of

## VULCANIZED RUBBER FABRICS

For Mechanical Purposes.

### MACHINE BELTING

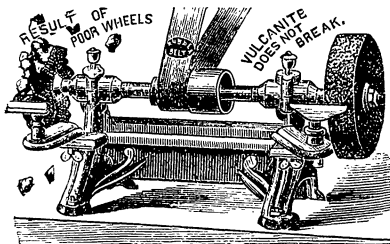
With Smooth Metallic Rubber Surface.



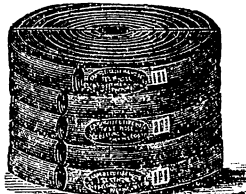
### RUBBER TEST HOSE

COTTON "CABLE" HOSE, CIRCULAR, WOVEN, SEAMLESS, ANTISEPTIC.

For the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories and Steamers.



### Rubber Cement.



### THE ORIGINAL SOLID VULCANITE EMERY WHEELS.

RUN EASY and SAFE, COOL and TRUE. ARE MORE DURABLE—HENCE CHEAPER. A trial will convince you of this. KNIFE GRINDING WHEELS A SPECIALTY.

Rubber Goods to Order for all Mechanical Purposes.

#### SALESROOMS:

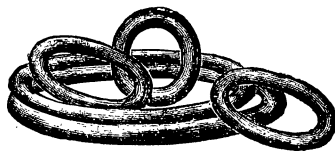
PHILADELPHIA, 308 Chestnut St.  
BOSTON, 52 Summer St.  
CHICAGO, 151 Lake St.  
DENVER, 1601-1611 17th St.  
CHARLESTON, 160 Meeting St.  
GRAND RAPIDS, 4 Monroe St.  
MINNEAPOLIS, 28 South 2d St.  
CLEVELAND, 176 Superior St.  
European Branch:—98 and 100 Queen Victoria St., London, England.

#### SALESROOMS:

SAN FRANCISCO, 17 Main St.  
DETROIT, 16-20 Woodward Ave.  
BALTIMORE, 12 N. Charles St.  
NEW ORLEANS, 8-12 N. Peters St.  
KANSAS CITY, 1311 and 1313 W. 12th St.  
ST. LOUIS, 616 Locust St.

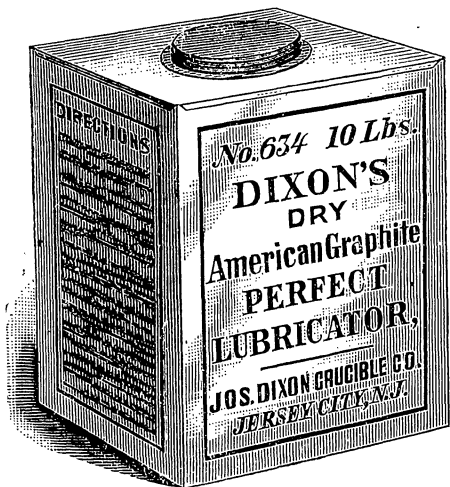
## H. O. CANFIELD,

MOULDED BRIDGEPORT, CONN.



RUBBER GOODS FOR MECHANICAL PURPOSES.

Small moulded work a specialty. Send for estimates for moulds and work.



Pure Flake Graphite Prevents Friction.

Everything that creaks, or squeaks, or sticks, or runs hard, will run easy and stop squeaking after a dose of Dixon's Dry Graphite.

Our new pamphlet tells all about it, and is sent free of charge.

**JOS. DIXON CRUCIBLE CO.,**  
JERSEY CITY, N. J.

## LEVIATHAN BELTING.



Positively unequalled for Strength, Durability and Traction Power; unaffected by Heat, Steam or Water.

Belts for Main Driving and work of a heavy nature a specialty.

### MAIN BELTING COMPANY

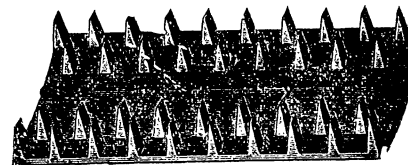
Sole Manufacturers,  
1219-1235 Carpenter St  
PHILADELPHIA.

248 Randolph Street, Chicago.

120 Pearl Street, Boston.

Send for Price-Lists and Samples.

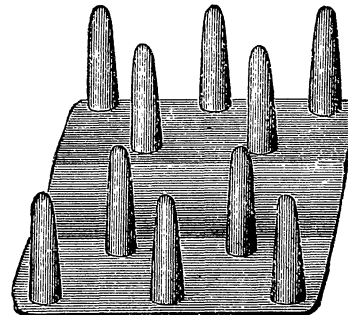
### Talcott's Original Wilson Belt Hooks



W. O. TALCOTT, Providence, R. I.  
MANUFACTURER OF

Four Styles of BELT HOOKS, including 134 Sizes.  
SEND FOR CATALOGUE.

### Thacher's Patent BELT FASTENERS.



Manufactured by  
The Claffen Manufacturing Co., Cleveland, O.  
Office, 71 and 73 Ontario St.

### FOR THE "Double Triple Quick Stroke" SHAPER

WRITE TO  
GOULD & EBERHARDT, Newark, N. J.



12 in., 16 in., 20 in., 24 in., 26 in., 30 in. stroke.

# E. W. BLISS CO.

16 ADAMS ST., BROOKLYN, N. Y.

**No. 18  
POWER PRESS**

\$112 Net, F.O.B. N. Y.

Weight 650 lbs

**No. 19  
POWER PRESS**

\$172 Net, F.O.B. N. Y.

Weight 1150 lbs.

**No. 20  
POWER PRESS**

\$258 Net, F.O.B. N. Y.

Weight 1850 lbs.

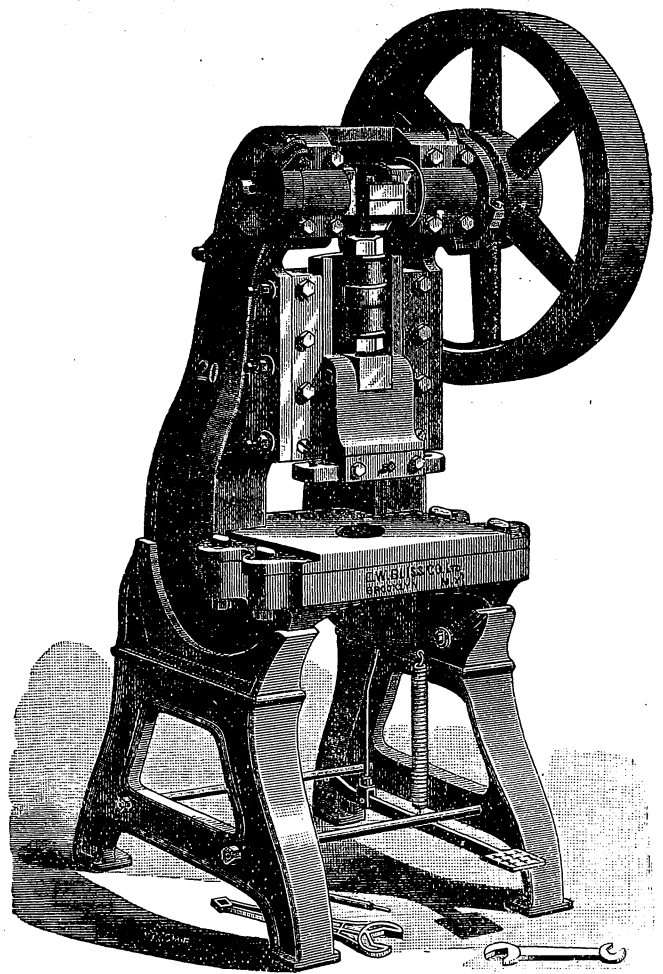
In consequence of improved facilities in the manufacture of our Standard Presses, we are in a position to offer the above at

## REDUCED PRICES

**FOR IMMEDIATE DELIVERY.**

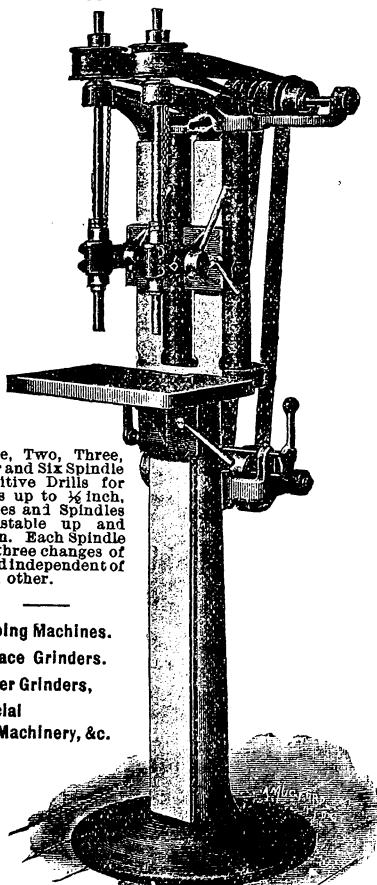
Presses, Punches, Shears, Dies, Drop Hammers and Special Machinery.

OWNERS ALSO OF  
**THE STILES & PARKER PRESS CO.**



No. 20 ADJUSTABLE POWER PRESS.

**Woodward & Rogers,**  
HARTFORD, CONN.



One, Two, Three, Four and Six Spindle Sensitive Drills for holes up to  $\frac{1}{4}$  inch. Tables and Spindles adjustable up and down. Each Spindle has three changes of speed independent of each other.

Tapping Machines.  
Surface Grinders.  
Cutter Grinders,  
Special  
Machinery, &c.

**SENT ON 30 DAYS'**

**METAL BAND SAW MACHINE,**

MADE BY

**Gross & Speirs Machine Co.**

WATERBURY, CONN.

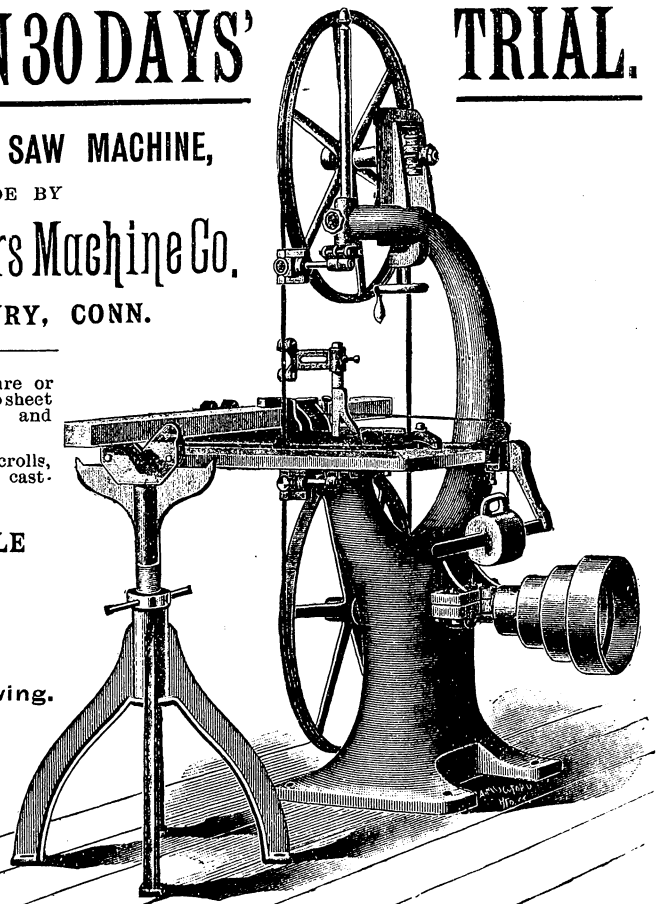
**SAWS** tubing, square or straight, also sheet brass, rods and bars.

**SAWS** curves and scrolls, gates from castings, etc.

**INDISPENSABLE**

TO ALL  
Metal Workers,  
Handy,  
Labor Saving.

Self-regulating and does not require skilled labor.



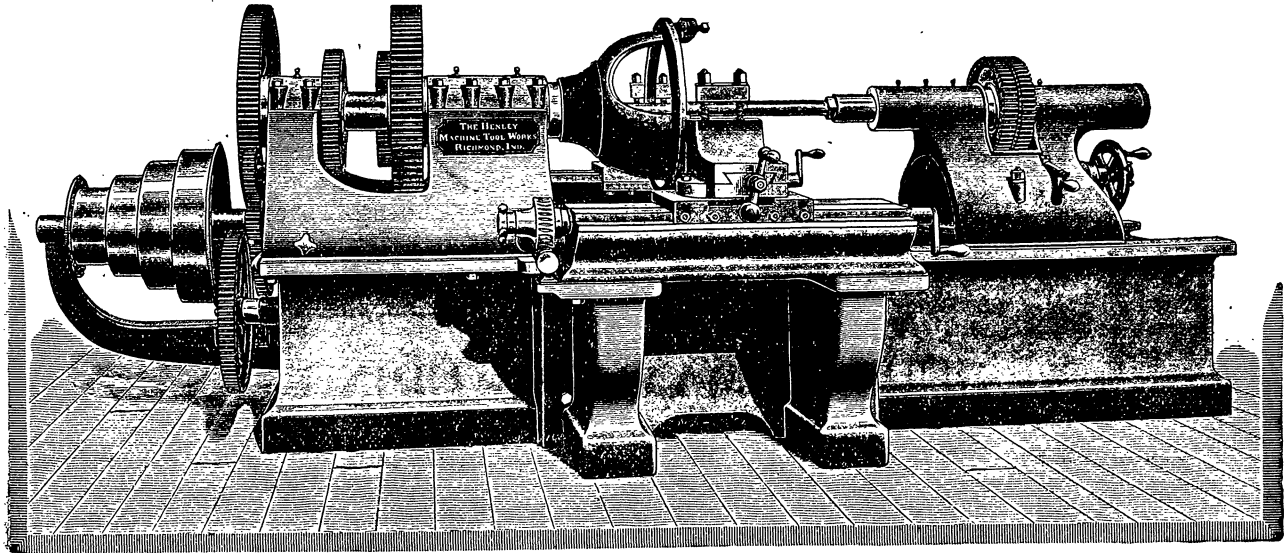
**SEND FOR PRICE.**

FOR TESTING IRON AND STEEL SPECIMENS, CAR COUPLERS, BRAKE SHOES, CHAIN, SPRINGS, WIRE, CEMENT, &c. &c.

# RIEHLE TESTING MACHINES,

Hydraulic Pumps and Presses, Robie Jacks, Marble Machinery, Iron Founders & Machinists.  
**Riehle Bros. Testing Machine Co.,**  
9th St. abv. Master, Phila

# PULLEY LATHES



Patented Feb. 17, 1891; June 14, 1887.

This cut represents the 42-inch Lathe. The 60-inch Lathe is of same design, but much heavier throughout. The 30-inch Lathe is of same general construction, with the bed supported on feet at each end.

These Lathes are especially designed for Simultaneously Boring and Turning Pulleys, both straight and crowning face, Cone Pulleys, Gear Blanks, and a variety of other work.

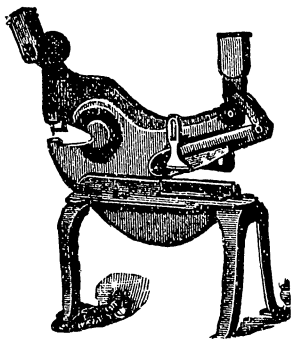
MANUFACTURED BY

**THE HENLEY MACHINE TOOL WORKS,** Richmond, Indiana.

## A FEW GOOD MACHINES,

MADE BY

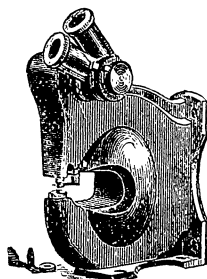
**BERTSCH & CO.,**  
CAMBRIDGE CITY, IND.,



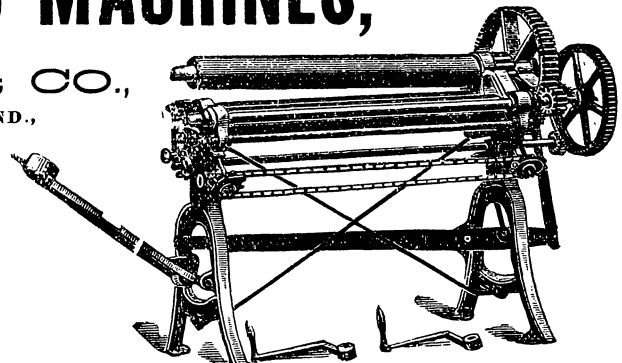
Who will quote price on any tool desired and can make almost anything you need.

**Improved Pat. Combined Punch and Stock Shears.** (7) different sizes from 200 to 1000 lbs for light or heavy work, 6 to 15 in. throat punch. A general purpose tool adapted for punching and cutting bar and sheet iron as desired. Also make a similar Punch or Stock Shear separate, Power Punches, Improved Pat. Slip Roll Formers, Plate Straightening Rolls, &c. Labor-saving Machines for working Sheet Metal.

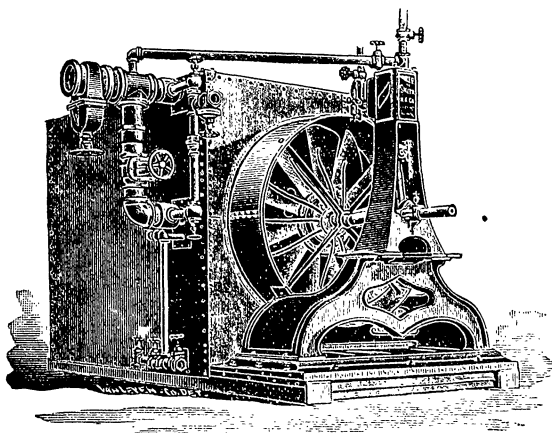
SEE THIS SPACE NEXT ISSUE.



General Purpose Punches.  
Powerful & Substantial.



**New Patent Quick Adjustable Slip Roll Formers.** A revolution in quickness and ease of adjustments, and opening the roll in one operation in elevated position as shown to remove the metal. All sizes from 2 in. to 12 in. rolls for large plates. Also similar Crimping or Corrugating Rolls, Improved Plate Straightening Rolls and Tools for working Sheet Metal. Notice this space next week. Beware of Infringements.



Boston,  
Chicago,  
New York.

**HUYETT & SMITH MFG. CO.,** DETROIT, MICH.

**The WATERBURY-FARREL FOUNDRY & MACHINE CO.,** Waterbury, Connecticut,

Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from Sheet Brass, Copper, Steel, Silver, &c.; **POWER PRESSES, HYDRAULIC PRESSES, Drop Presses, Foot Presses, RIVET MACHINES, Gang Slitters, Grinding Machines, Steel Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.**

For Heating  
Schools,  
Churches,  
Factories,  
Stores,  
Machine and  
Railroad Shops.

## BOOK CATALOGUE.

Send for descriptive catalogue with list of contents of new and standard books on the following subjects:

**Assaying and Analysis.**  
**Casting and Founding.**  
**Iron, Steel and Metallurgy.**  
**Locomotive Engines and Cars.**  
**Engineering and Mechanical**  
**Drawing, Machine Designing,**  
**Etc.**  
**Minerals, Mines and Mining,**  
**Plumbing and House Drainage**  
**Heating and Ventilation.**  
**Tools and Machinery.**  
**Steam Engineering, etc.**  
**Mechanical Engineering**  
**Bridge and Roof Construction.**  
**Pumps, Hydraulics and Water**  
**Supply.**  
**Civil Engineering.**  
**Electricity.**  
**Miscellaneous.**

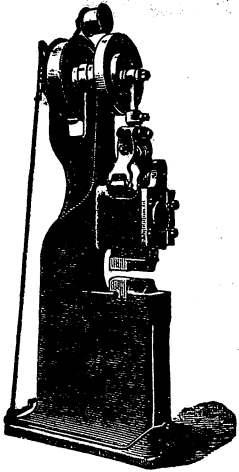
MAILED FREE.

**DAVID WILLIAMS,**

Publisher and Bookseller,

96-102 Reade St., New York.





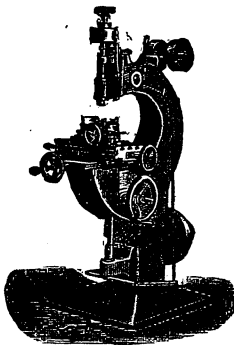
## The Dupont Power Hammer.

ITS POINTS OF SUPERIORITY.

### No. 2. SIMPLICITY OF CONSTRUCTION.

No Hammer made at the present time has less parts than this one. The constant study of the inventor and manufacturers has been to reduce it to the smallest possible number. The solid head of frame in which the crank-shaft runs precludes all possibility of cap bolts getting loose or shaft getting out of line. While every effort has been made to have few parts, nothing necessary for the good working of the Hammer has been omitted.

**DUPONT MANUFACTURING COMPANY,**  
ST. JOHNSBURY, VT.



NO. 2.

## THE BECKER UPRIGHT UNIVERSAL MILLERS

Have a remarkable range of utility and are more indispensable than common horizontal millers.

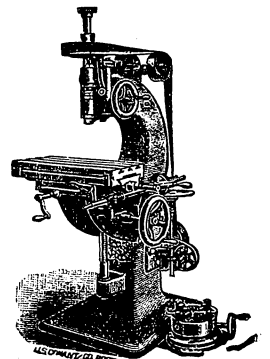
**No. 2** is adapted for a great variety of light milling, carrying mills from 1-32 in. diam. up to 2 in. diam. Speeds from 100 to 10,000 revolutions per minute.

**No. 3**, for all round work, such as *Face Milling, Milling Dovetail Slides, Key Seating, Splining, Boring* and many other purposes. Carries mills from 1-8 in. to 4 in. diam. Speeds from 40 to 2000 revolutions per minute.

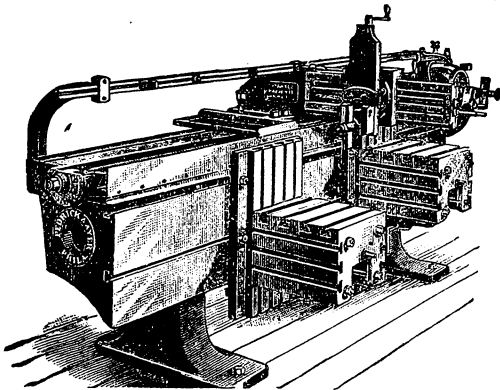
SEND FOR CATALOGUE.

JOHN BECKER MFG. CO.,

Fitchburg, Mass.



NO. 3.



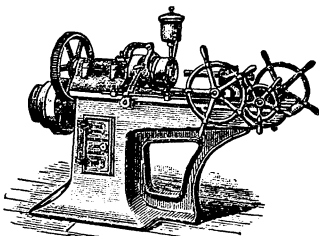
## Richards' Patent Open Side Planing and Shaping Machine.

This machine is particularly valuable for both general and special work. As a labor saving machine it has few equals and no superiors. It is warranted in every way in regard to efficiency, true working, rigidity and cutting power. Made any size required. Special catalogue mailed on application.

**PEDRICK & AYER,**

Nos. 1001 & 1003 Hamilton Street. - Philadelphia, Pa.

**THE NATIONAL MACHINERY CO.,**  
TIFFIN, OHIO,  
— MANUFACTURERS OF —  
**BOLT AND NUT**



**MACHINERY**

OF EVERY DESCRIPTION.

Upsetters and Benders,

Car Link and Pin Machinery.

CATALOGUE SENT ON APPLICATION.

E. L. MAXWELL, Pres.

C. A. MOORE, Vice-Pres.

H. S. MANNING, Treas.

M. LUSCOMB, Sec.

## THE ASHCROFT MANUFACTURING COMPANY,

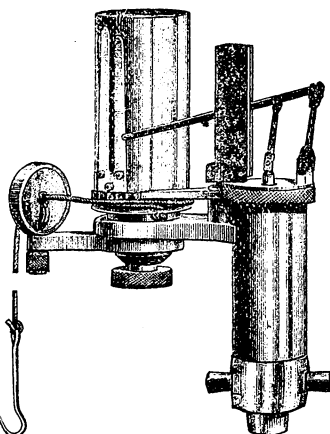
SOLE MANUFACTURERS OF

### THE TABOR STEAM ENGINE INDICATOR.

The only instrument that will make accurate diagrams at either high or low speeds. In use all over the World where accuracy is desired. Approved and adopted by United States Government on the new Cruisers.

Use the Coffin Averaging Instrument; determines the area of any irregular figure. Gives mean effective pressure (M. E. P.) of an indicator diagram without computation. Absolute accuracy. Easy to manipulate. No liability to error. One diagram per minute measured without effort.

Also Steam and Vacuum Gauges, with Patent Seamless Drawn Tube, Steam Traps, Packer Ratchet Drills, Stanwood Cutters, Marine Clocks, Engine Revolution Counters, Test Gauges, Oil Cups, Test Pumps, Locomotive Spring Balances, Steam Whistles, Salinometers, and all instruments for Measuring Steam, Air, Gas, or Water.



Office and Salesroom, 111 Liberty St., N. Y.

Factory, Bridgeport, Conn.

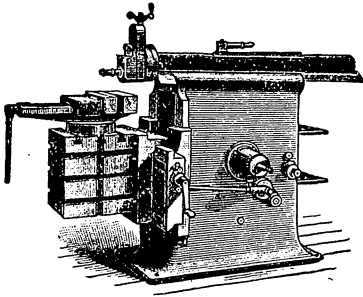
Address all Letters to P. O. Box 3754, New York.



# LINK-BELT

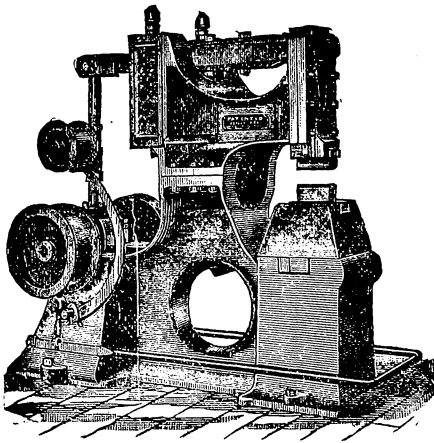
ENGINEERING CO.  
NICETOWN.  
PHILA.  
49 DEY ST.  
NEW YORK.

Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting,  
Dodge Chain, Howe Chain, &c. Western connection.  
[CHICAGO.] [LINK BELT MACHINERY CO.]



The Henderson Machine Tool Co.  
Office and Works,  
23d and Filbert Sts., PHILADELPHIA, PA.  
MANUFACTURERS OF  
Sheet Metal Presses, Shears, Tools, Etc.  
Machinists' Shapers, Milling Machines  
AND SPECIAL MACHINES.  
Correspondence Solicited.

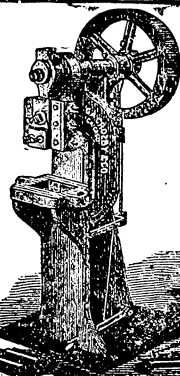
## JENKINS' POWER HAMMERS.



Adjustable and elastic stroke, nicety of regulation, efficiency of action, simplicity and durability of construction and the absence of leather straps, steel springs and all complication, combine to make this hammer the favorite wherever used.

JENKINS & LINGLE,  
BELLEFONTE, PA.

G. A. CROS  
Manufacture  
PRESSE  
SPECIAL MA  
SHEET METAL  
176 178 So. Clinton



BY CO.  
S. DIES  
CHINERY  
WORKERS  
St. Chicago, Ill.

## PITTSBURGH MFG. CO.,

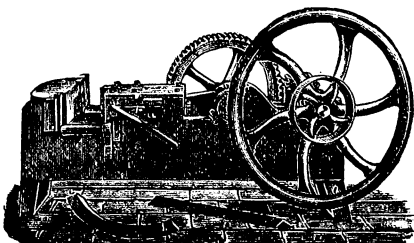
Manufacturers of

Crosgrove's Patent Straightening, Bending and Punching Machines.

NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

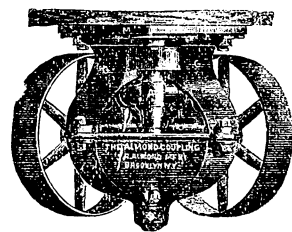
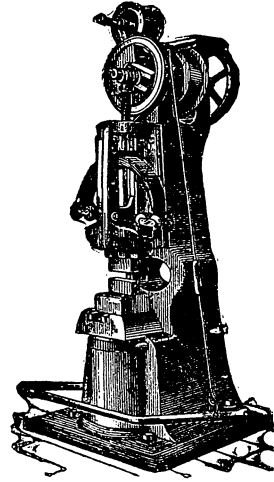
PITTSBURGH - - PA.



## If You Use Power Hammers

Write to us for Circulars.

BELDEN MACHINE CO.  
NEW HAVEN, CONN.



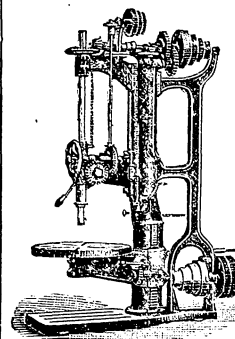
THIS CUT REPRESENTS  
ALMOND'S PAT. QUARTER-TURN COUPLING  
To Replace Mule Pulleys and Bevel Gears.  
It is a noiseless quarter-turn countershaft, self-contained, perfectly lubricated, and gives no trouble.  
Send for particulars.  
T. R. ALMOND, 83 and 85 Washington Street Brooklyn, N. Y.

## NEW HAVEN MANUF'G CO.

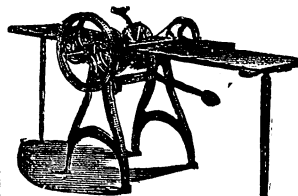
New Haven, Conn

Manufacturers of

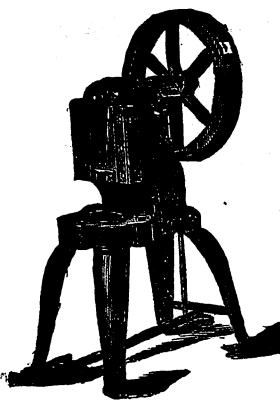
Lathes,  
Planers,  
Shapers,  
Slotters,  
Etc.



BARNES  
Hand and Foot Power Machinery,  
FOR CARPENTERS AND BUILDERS.



Complete Line of Seven Machines.  
Hand Circular  
Rip Saw  
Combined Rip and Cross-Cut Saw (with Scroll Saw and Boring Attachments).  
Scroll Saw, Former, Mortiser, Tenoner & Lathe  
Discounts to the trade on application. Send for Catalogue and Price-List.  
W. F. & JOHN BARNES CO.,  
69 Ruby Street, ROCKFORD, ILL.  
ENGLISH AGENTS, CHAS. CHURCHILL & CO.,  
Cross Street Finsbury, E. C., London.



**A. H. MERRIMAN,  
MERRIDEN, CONN.,**  
**PRESSES.**  
Catalogue and prices sent on application.

**GEO. V. CRESSON CO.**

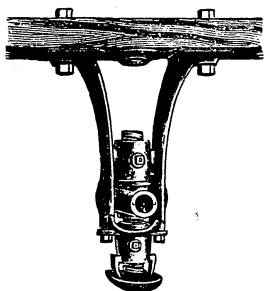
18th St. and Allegheny Ave.,

PHILADELPHIA, PA.

**SHAFTING**  
AND

TRANSMISSION MACHINERY

Electric Light Plants Designed  
and Completely  
Furnished.

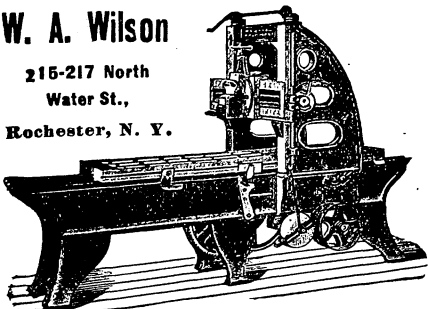


Our New Patent Improved Part-  
ing Hangers, with or with-  
out Self-Oiling Bearings.

**W. A. Wilson**

215-217 North  
Water St.,

Rochester, N. Y.



Improved Iron Planers a specialty. 20 x 20, 22 x 22  
24 x 24 up to 42 x 42, to plane any length. Send for  
description and price-list before purchasing. Manu-  
facturers' agent for other tools and machinery. Men-  
tion *The Iron Age*.

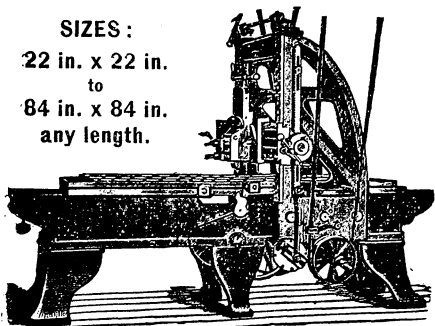
**THE POWELL PLANER CO.**

SIZES:

22 in. x 22 in.

to

84 in. x 84 in.  
any length.



WORCESTER, MASS.

**GEORGE H. EATON & COMPANY,**

Office, 10 Mt. Washington Av.,

Boston, Mass., U. S. A.

MANUFACTURERS OF

Power, Drawing, Screw, Lever  
and Drop

**Presses and  
Dies.**

HAND, POWER, ROTARY AND SQUARING  
**SHEARS.**

CATALOGUES ON APPLICATION.

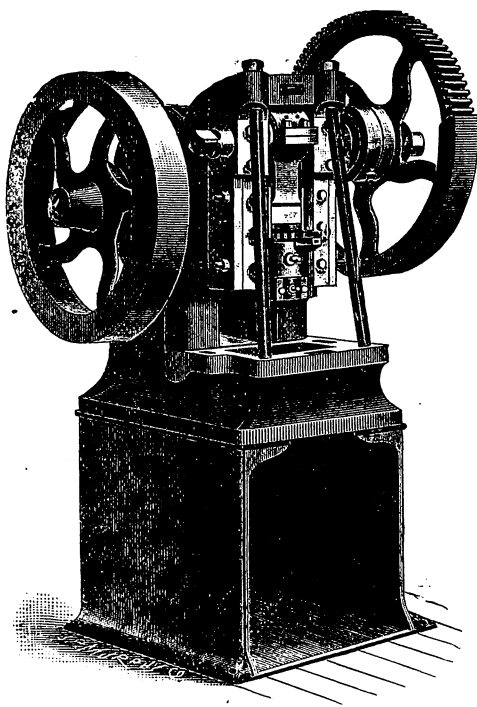
SELLING AGENTS.

Hill, Clarke & Co., 12 and 14 So. Canal St.,  
Chicago, Ill.

The Parkin & Bosworth Co., 9 and 11 So.  
Water St., Cleveland, O.

The Fairbanks Company, 701-705 Arch St.,  
Philadelphia, Pa.

The Garvin Machine Co., Lighthouse and Canal  
Sts., New York, N. Y.



**HYDRAULIC JACKS.**

All sizes. All styles. All warranted.

**HYDRAULIC PRESSES,**

PUMPS, ACCUMULATORS, VALVES, GAUGES, FITTINGS, &c.

WATSON & STILLMAN,

204-210 E. 43d St., New York

**Presses, Dies, Presses,**

OF ALL KINDS FOR

**Sheet Metal Ware.**

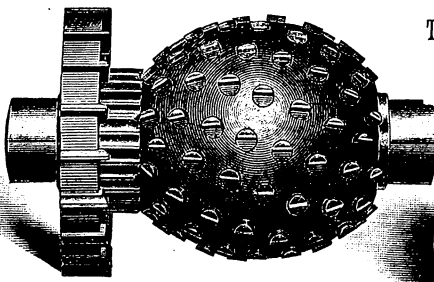
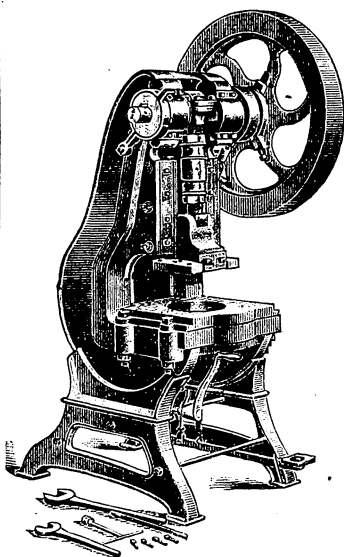
Difficult and Intricate Drawing  
Stamping, Embossing, Wiring,  
Blanking and Combination  
Dies a Specialty.

SUBMIT SAMPLES AND WRITE FOR PRICES.

**Stark Machine & Tool Co.,**

BUFFALO, N. Y.

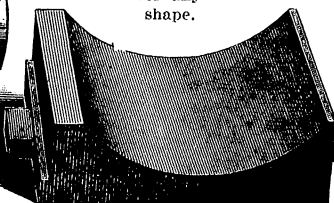
Send for Catalogue and mention "*The Iron Age*."

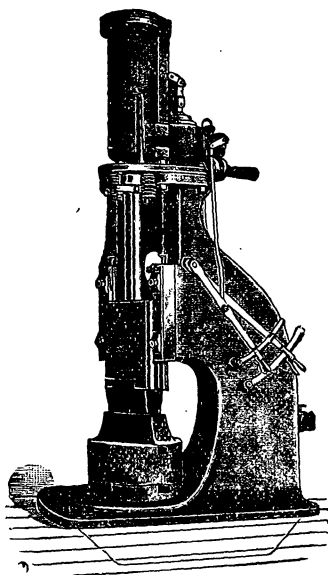


Pat. Dec. 24, '89.

The Ingersoll Milling Mch. Co., Rockford, Ill.  
MILLING MACHINES,  
15 inch to 36 inch square.  
MILLING CUTTERS

For any  
shape.





## Bement, Miles & Co.,

PHILADELPHIA, PA.,

Builders of

### Metal-Working Machine Tools

For railroad shops, locomotive and car builders, machine shops, steam forges, shipyards, boiler shops, bridge works.

Steam Hammers for Working Iron or Steel.

NEW YORK OFFICE, Equitable Building.

GEORGE PLACE, Agent.

### THE STURTEVANT IMPROVED PORTABLE FORGES.

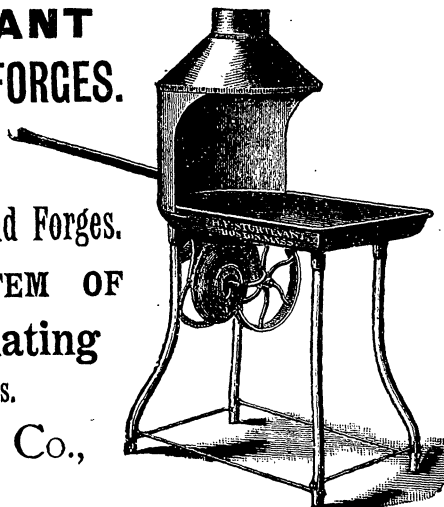
### PRESSURE BLOWERS,

For Cupola Furnaces and Forges.

THE STURTEVANT SYSTEM OF  
Heating and Ventilating  
Manufacturing Establishments.

B. F. STURTEVANT Co.,  
BOSTON, MASS.

91 Liberty Street, New York;  
16 South Canal St., Chicago.



135 North Third St.,  
Philadelphia.

### THE COULTER & MCKENZIE MACHINE CO., BRIDGEPORT, CONN.

### TAPER ROLLING MACHINES and SPECIAL MACHINERY.

### FITCHBURG MACHINE WORKS,

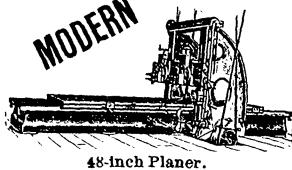
MANUFACTURERS OF THE CELEBRATED

FITCHBURG

AND OTHER

SEND FOR  
CATALOGUE B.

MODERN



48-Inch Planer.

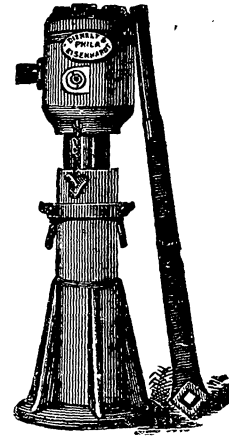
ENGINE LATHE

METAL-WORKING MACHINES,

FITCHBURG,  
MASS.

### RELIANCE HYDRAULIC JACKS.

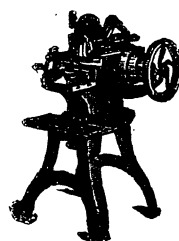
SUPERIOR TO ANY JACK NOW MADE.  
Absolute in its actions in any position.  
Under complete and instantaneous control.



MADE IN FOUR SIZES,  
10, 15, 20 and 30-ton capacity, to lift 12 or 18  
inches. Broad Base or Ground Lift.

DIENELT & EISENHARDT  
Makers.

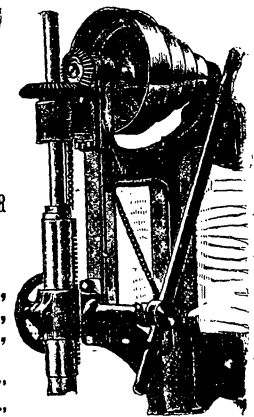
1308 Howard Street, Philadelphia.



BOYNTON & PLUMMER  
Worcester, Mass.,  
Manufacturers of  
Belt Cutting  
Machines,  
Shaping Machines,  
Drilling Machines,  
&c., &c.

CHAS. CHURCHILL & Co.,  
Agents, 21 Cross St.,  
Finsbury, London, E.C.,  
England.

Overhead or Hanging Drill  
(Lever Feed.)



### AUTOMATIC REGISTER.

The most accurate and reliable counter manu-  
factured. Made entirely of metal.



Handsomely finished. Can be used on any  
machine. Send for circular.

G. EDW. OSBORN & CO.,  
391, 393 & 395 State St., New Haven, Conn.

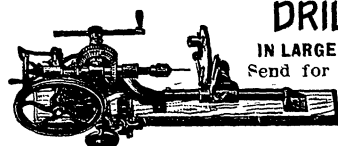


FOR  
Substantial, Well Made,  
Low Priced, Patented

20 Inch Drills,

with latest improvements,  
Lever, Combination or Wheel  
Feed, address

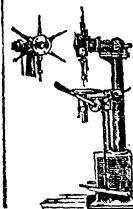
Sibley & Ware,  
South Bend, Indiana



DRILLS

IN LARGE VARIETY.  
Send for Catalogue  
E.

GEO. BURNHAM & CO., Worcester, Mass.



QUINT'S TURRET DRILLS.

Six Spindle.

Drills from 1-32 to 1/2 hole. Speed  
from 250 to 2000 rev.

Suitable for a large variety of  
work and is operated with ease  
and rapidity.

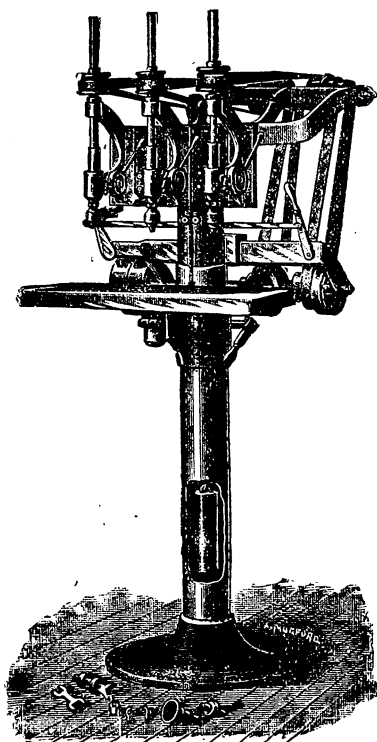
SEND FOR CIRCULAR.

A. D. QUINT, Hartford Conn.

**PATENT RAW HIDE BOUND MALLETS & CHISEL HANDLES.**  
POSITIVELY WILL NOT SPLIT  
**PATENT RAW HIDE PINIONS**  
ESPECIALLY ADAPTED TO HIGH SPEED MACHINERY. NOISELESS  
MORE DURABLE THAN METAL. NO LUBRICANT REQUIRED.  
NEW PROCESS RAW HIDE CO.  
PATENTEES & SOLE MANUFACTURERS SYRACUSE N.Y., U.S.A.

**SIGOURNEY DRILLS,**

IMPROVED.



Sensitive, Strong and Interchangeable.

One, Two and Three Spindles.

Counter-balanced Spindles and Tables. Vertical range of table, 30 inches, and it will swing to right or left.

SEND FOR CIRCULAR.

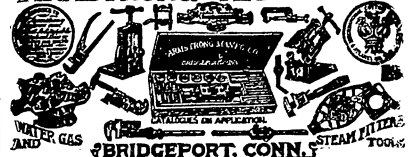
**THE SIGOURNEY TOOL CO.,**  
 Hartford, Conn.

**MACHINISTS' SCALES**  
 PATENT END GRADUATION.

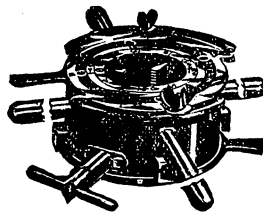
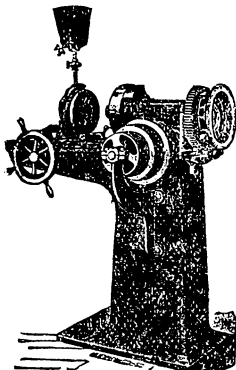
Liberal Discount to the Trade. Send for List.

COFFIN &amp; LEIGHTON, Syracuse, N. Y.

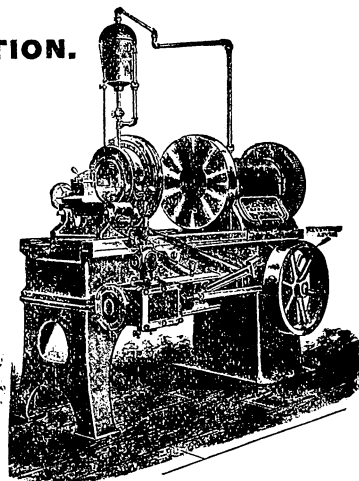
**LIGHT DRILL PRESSES**  
**MFRS. OF THE LARGEST VARIETY**  
**SEND FOR NEW 80 PAGE CATALOGUE**  
**JUST OUT DWIGHT SLATE MACHINE CO. HARTFORD, CONN.**

**ARMSTRONG MAN'G. CO.**

OUR ADJUSTABLE STOCKS and DIES are universally acknowledged to be the BEST! We also make all our Tools on the same principle, of the Best Material and Workmanship, and always with a view of time and labor saving in their use.

**JARECKI MFG. CO. (Limited), Erie, Pa.**
**PIPE THREADING AND CUTTING TOOLS OF ALL DESCRIPTION.**


Write for Catalogue showing the most complete line of 1-8, inch to 16 inch for hand, belt, engine and with electric motor attachment.



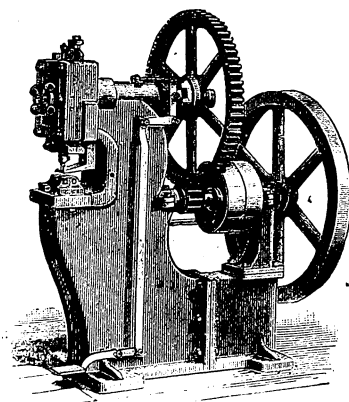
We can furnish Bolt Threading Attachment for this Machine.

W.W. MINER

G.W. PECK

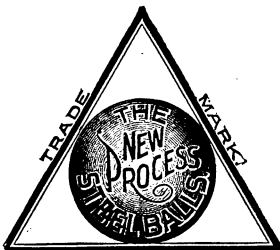
S. PECK

**MINER & PECK M'FG CO.,**  
 SUCCESSORS TO  
**BEECHER & PECK**  
 SOLE MANUFACTURERS OF  
**THE PECK PATENT DROP PRESS**  
**DROP FORGINGS, BLAST FORGES.**  
**NEW HAVEN, CONN.**

**Nos. 3, 4 and 5**

SINGLE GEARED PUNCH.

 The illustration represents our single geared punch. We build it in 3 sizes, single or double, to  $\frac{1}{4}$  inch to  $\frac{5}{8}$  inch hole through same thickness of iron. Made with any length of throat from 7 inch to 24 inch.

**The Wais & Roos Punch and Shear Co.,**  
 CINCINNATI, O.
**STEEL BALLS**

For all purposes, from Bicycles to the heaviest class of machinery. Write to us for prices and samples, also for information when in doubt about the proper application of balls to heavy bearings.

**GRANT ANTI-FRICTION BALL CO.,**

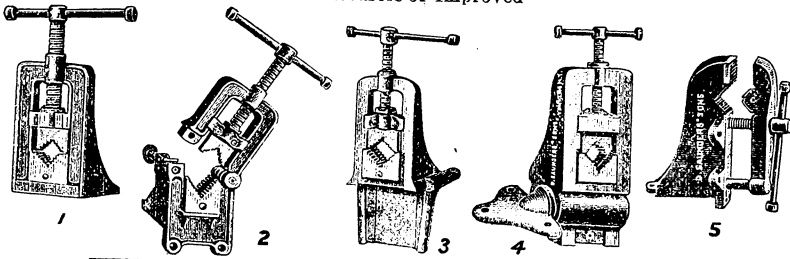
Fitchburg, Mass.


**Bullock Bellows Co.,**  
 Cleveland, Ohio.

 Largest  
 Mfrs.  
 in the  
 World

**D. SAUNDERS' SONS,**

Manufacturers of Improved

**PIPE VISES**

of all styles and sizes, holding  $\frac{1}{8}$  in. to 8 in. pipe, made of MALLEABLE IRON, CAST IRON and STEEL. Also PIPE THREADING MACHINES  $\frac{1}{4}$  in. to 16 in., Hand Pipe Cutters, Stocks and Dies, Tapping Machines, etc. Send for catalogue to

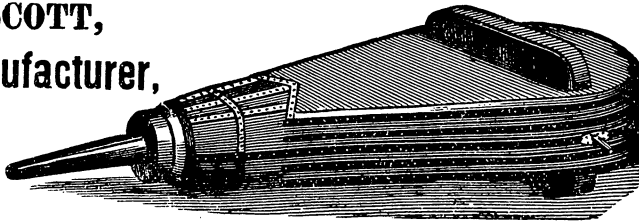
27 Atherton Street, Yonkers, N. Y.

**GEO. M. SCOTT,****Bellows Manufacturer,**

Johnson Street

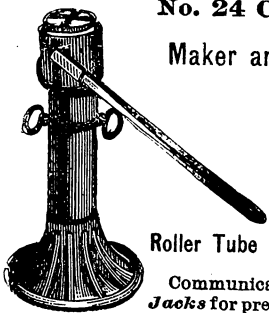
Cor. 22d St.,

CHICAGO ILL.

**RICHARD DUDGEON,**

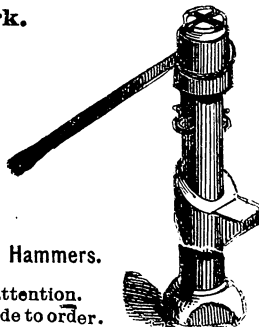
No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

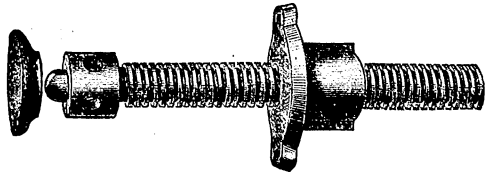
**Hydraulic Jacks**  
AND  
**Punches.**


Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.  
Jacks for pressing on Car Wheels or Crank Pins made to order.

**Illinois Iron AND Bolt Co.,**

MANUFACTURERS OF

**HOUSE-RAISING SCREWS.**SEND FOR  
PRICE LIST.SEND FOR  
PRICE LIST.**PRESS SCREWS,**

FOR PRESSING

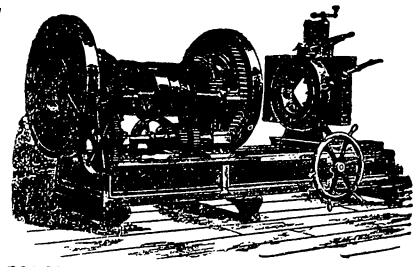
Cheese, Wine, Cider, Lard and Tobacco.

ALSO,

 Locomotive, Track, Wagon and Bell Base,  
Tripod and Carrying Ratchet
**JACK SCREWS.**

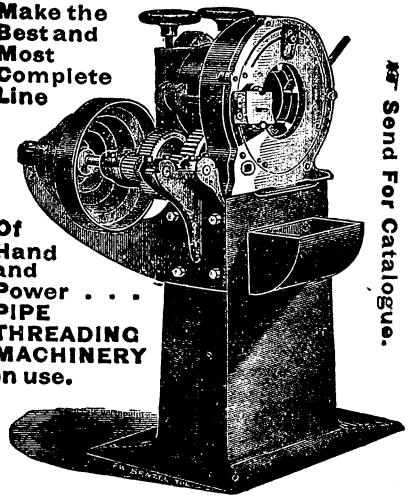
Nos. 20 to 26 Main Street,

CARPENTERSVILLE, Kane Co., - ILLINOIS.

**BIGNALL & KEELER MFG. CO.,** St. Louis MO.MANUFACTURERS OF  
Peerless Duplex Pipe Cutting and Threading  
Machines. Send for Catalogue.

Our Prices are Low and our Goods are the Best.

**The Merrill Manufacturing Co.,**  
Toledo, Ohio,

 Make the  
Best and  
Most  
Complete  
Line


Send For Catalogue.

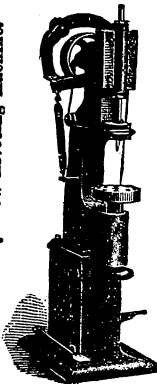
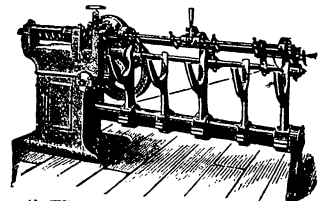
 Of  
Hand  
and  
Power . . .  
PIPE  
THREADING  
MACHINERY  
in use.
**JOHN ADT & SON,**

New Haven, Conn.

BUILDERS OF

MACHINERY FOR HARDWARE MANUFACTURE.

Elastic Rotary-Blow Riveting Machine.


 Butt Milling  
Machinery,  
Butt Drilling  
Machinery,  
Riveting  
Machines,  
Wire Straightening  
Machinery,  
Foot Presses,  
Sprue Cutters,  
Etc.


Automatic Wire Straightening and Cutting Machine.

**Corporation Stops**

—FOR—

HADESTY and other Tapping Machines.

Write for prices to

**ANTHRACITE BRASS WORKS,**  
Tamaqua, Pa.

 The Mechanical and Other Properties of Iron and  
Steel in Connection with their Chemical Composi-  
tion. By A. VOSMAER. 203 pages, cloth, . . . \$2.50  
For Sale by David Williams, 96-102 Reade St., N.Y.

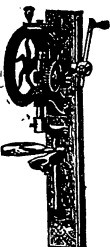




### The No. 1 Champion Lever Blacksmith Forge

Largest Blacksmith Forge in America

Fan 16 inches in diameter with a five inch outlet, Hearth 32 by 45 inches. Provided with our Patent Sloped Bottom Coal Box, which holds one-half bushel. This Slope Bottom Coal Box, in connection with the enormous size of Fan and Hearth, makes this Forge the greatest tool in America for the Blacksmith for quick and easy work.



### The World's Champion \$10.00 New Upright Self-Feed 1891 Pattern Post Drill.

Weight, 120 Pounds.

Drills from 0 to 1 1/4 inch hole and to centre of a 15-inch circle. The Crank has Two True and Honest Speeds that can be shifted from shaft A to shaft B (or balance wheel shaft), precisely like all high-grade and high-priced drills, and not a blindfold imitation of a double speed drill made with a wooden handle riveted on the rim of the fly wheel, at a cost of just 1 1/2 cents, necessitating the blacksmith to have a helper, or turn the drill with the Left Hand, as one man operating must face the drill to do the work, giving one hand for motion and the other for lifting and handling the work. By referring to illustration it will be seen that the Gears on this Drill are all provided with Two Journal Bearings, one on each side, this being the most important feature to make a drill strong and powerful, and just where all cheap-made Drills are weak, as their main driving gear revolves on a simple stud, cheaply screwed into the weakest part of the backbone, which is not only cheap and flimsy in construction, but not practical, which none know better than the intelligent mechanic. Our Catalogue illustrates Five Heavier Drill equally as cheap as the above.



### Champion 1890 Lever Blower Guaranteed King of all Blowers.

The 1890 is the only Double Geared Blower made. It will produce one-third more blast with 20 strokes per minute, than any other Lever Blower will produce with 30 strokes per minute, a labor saving of 600 strokes per hour, or 6000 strokes per day of 10 hours steady work. It works easy and noiseless. At a trial test a little girl six years old easily furnished the blast to put a welding heat on a 4-inch iron. Dimensions of 1890 Blower: Fan, 16 inches; Wheel, 25 inches in diameter.

All our Champion Lever Blowers and Forges are supplied with our World Renowned Champion Lever Motion with a record of eight years' constant use, and without a single repair to our knowledge, and is now on more than 55,000 Blowers and Forges in every day use.

## CHAMPION BLOWER & FORCE CO.

Lancaster, Pa., U. S. A.

### A Practical Workshop Companion for Tin, Sheet-Iron and

Copper-Plate Workers. By LEROY J. BLINN, new revised, enlarged edition. with over 170 newly engraved illustrations: 296 pages: 12mo. cloth.....\$2.50

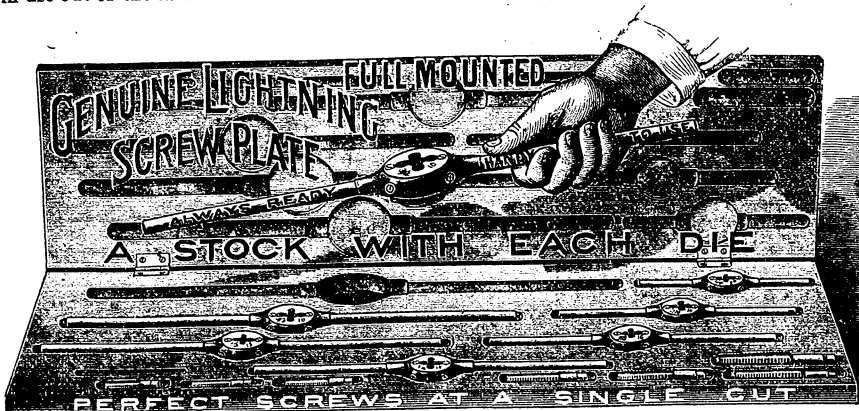
This deservedly popular book has been thoroughly revised and contains over 100 additional pages, with 170 newly engraved illustrations. The volume contains rules for describing various kinds of Patterns used by Tin, Sheet-Iron and Copper-Plate Workers: Practical Geometry; Mensuration of Surfaces and Solids; Tables of the Weights and Strengths of Metals and other Materials; Tables of Areas and Circumferences of Circles; Composition of Metallic Alloys and Solders, with numerous valuable Receipts and Manipulations for every-day use in the workshop. Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher,

96-102 Reade St. New York.

## A New Screw Plate. THE FULL MOUNTED LIGHTNING.

These plates have a stock with each die. The dies are our celebrated adjustable Lightning dies. Each stock is of correct length and weight to suit size of die. Several sizes of dies may be in use out of the same set at the same time. Send for catalogue.

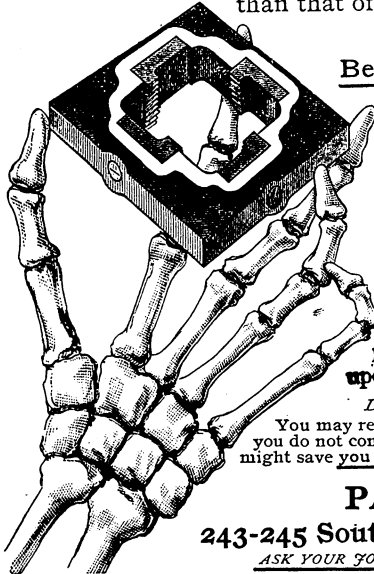


Made by WILEY & RUSSELL MFG. CO., Greenfield, Mass., U. S. A. Send for new catalogue.

## Maule's "Skeleton" Pipe-Die

Two "Points" about it—only 2 (There are plenty more, but we only mention these two here.)

The First Cost to you of MAULE'S "SKELETON" PIPE DIE is less than that of any other Pipe-Threading Die—and



Before it becomes dull from use it will cut as many perfect threads as the best solid die extant, and when it is dull, you don't throw it away and buy a new one—Oh, no! You simply sharpen the cutters on a common grindstone, and so make it practically as good as it was at first, and this sharpening process may be repeated a number of times.

A sample One-inch "Skeleton" Pipe Die, either 2 3/8 or 2 1/2 x 3/4 thick, by mail, postage prepaid, will cost you 62 cents, and will be sent upon receipt of a Postal note for that amount.

DO NOT SEND US ANY POSTAGE STAMPS.

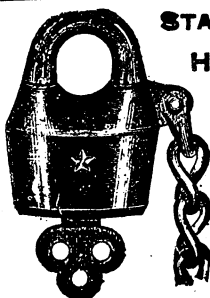
You may return such sample to us, at our expense, if, after seeing it, you do not consider it worth the price. Don't the above sound as if it might save you some money—if TRUE?

PANCOAST & MAULE,

243-245 South Third St. Philadelphia, U. S. A.

ASK YOUR JOBBER WHAT HE KNOWS ABOUT THIS TOOL.

Wire Drawing Machines, **WATERBURY**  
Gang Slitters,  
**MACHINE CO.,**  
Power Presses and Dies, Waterbury, Conn.,  
Tumbling Barrels,  
**MANUFACTURERS.**  
Special Machinery. Send For Prices.



STAR LOCK WORKS, PHILA.

HILLEBRAND & WOLF,

MANUFACTURERS OF

1ST QUALITY ONLY

SCANDINAVIAN

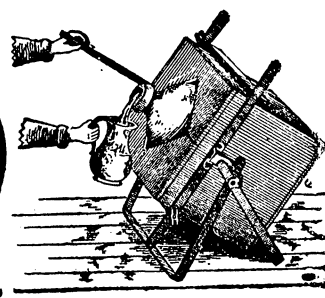
AND

SPRING PADLOCKS

TRUNK & CASE LOCKS

CARBOY STANDS, &c.

CATALOGUES SENT ON APPLICATION.

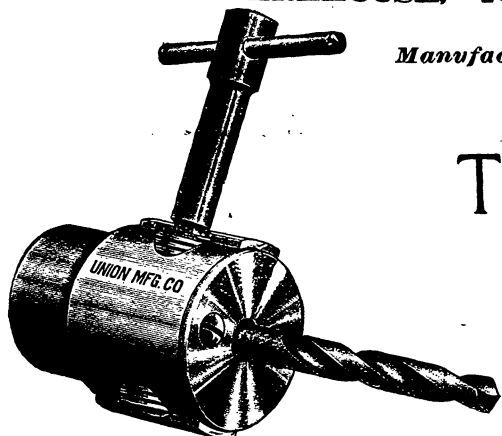




# UNION MANUFACTURING COMPANY, NEW BRITAIN, CONN.

WAREHOUSE, 103 CHAMBERS ST., NEW YORK.

Manufacturers of Combination, Universal, Independent, and Combination Reversible Jaw Chucks.



## THE UNION DRILL CHUCK.

NUMBER.	DIAMETER.	HOLDING.	LIST.
100	2¼ inches.	0 to ½ inch.	\$8.00
101	2¾ " "	0 to ¾ inch.	9.00
102	3½ " "	0 to 1 inch.	10.00

## "CUSHMAN" CHUCKS.

We manufacture and keep in stock a full line of chucks for all purposes.

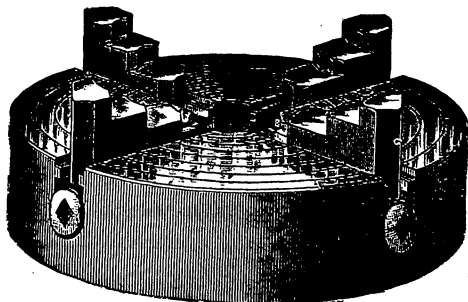
- Independent 4 Jaw Chucks from 4 to 26 Inch.
- Patent 4 Jaw Lathe Chucks from 4 to 26 Inch.
- Reversible Face-Plate Jaws for Use on Lathes from 30 to 72 Inch.
- Two-Jaw Chucks, Round and Box Body, from 4½ to 18 Inch.
- Universal Chucks from 2 to 21 inch, in several styles.
- Combination Chucks from 4 to 24 Inch.
- Drill Chucks, four styles.
- Centering Chucks.
- Special Chucks for Cutting-off Machines. A full line and some new improvements.

We also make a great variety of special Chucks for holding bicycle parts, valves, fittings and other special shaped pieces.

A 44 PAGE CATALOGUE SENT ON APPLICATION.

## THE CUSHMAN CHUCK CO., Hartford, Conn.

### CHAMPION INDEPENDENT CHUCKS.

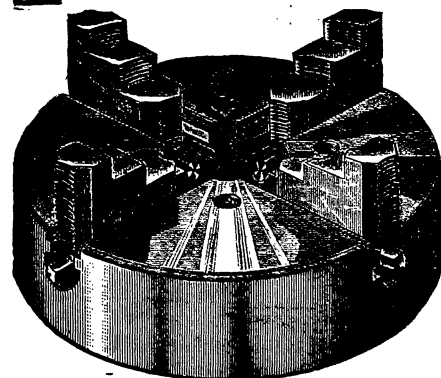


An entirely new line of small Chucks, provided with 3 or 4 independent reversible steel jaws. The best Chuck in the market for foot lathes. Ask your dealer for them or write to us.

THE D. E. WHITON MACHINE CO.  
New London, Conn.

Sole European Agent SELIG SONNENTHAL & CO., London.

### IMPROVED INDEPENDENT CHUCK



This cut represents a line of Improved Independent Reversible Jaw Chucks that we have lately added to our large list of Universal and Combination Chucks. We make this style of Chuck in eighteen sizes, varying in size by two inches from four to thirty-eight inches in diameter. Send for Illustrated Price List.

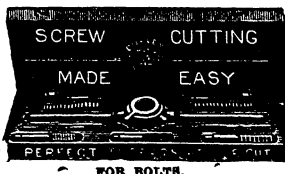
The E. HORTON & SON CO.,  
Windsor Locks, Conn., U. S. A.,  
Or CHAS. CHURCHILL & CO., 21 Cross  
St., Finsbury, London, E. C., England.



### THE ADJUSTABLE "DUPLEX" DIE STOCK.

Quick. Accurate. Durable.  
15,000 now in use.

HART MANUFACTURING CO.,  
CLEVELAND, O., U. S. A.

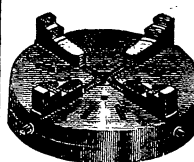


C

### Chucks

The NATIONAL  
INDEPENDENT.  
UNIVERSAL.  
COMBINATION.

Strongest. Easiest to change. Best Finish.  
Reversible Jaws (patented) giving 5 changes  
including every possible desired position.  
New CATALOGUE, illustrated, sent free. Liberal discounts. Prompt shipment. Address  
WM. WHITLOCK, 132d St. & Park Ave., N. Y.



### SKINNER CHUCKS.

Independent, Universal and  
Combination Lathe Chucks.  
Also DRILL CHUCKS.  
Skinner Chuck Co.,  
NEW BRITAIN, CONN.

Send for CATALOGUE.



### CHUCKS ALL STYLES.

NEW REVERSIBLE JAWS

(DOVETAILED). '02 Catalogue now ready.  
THE HOGGSON & PETTIS MFG. CO.  
Est. 1849. NEW HAVEN, CONN.



### Portable Drilling Machines

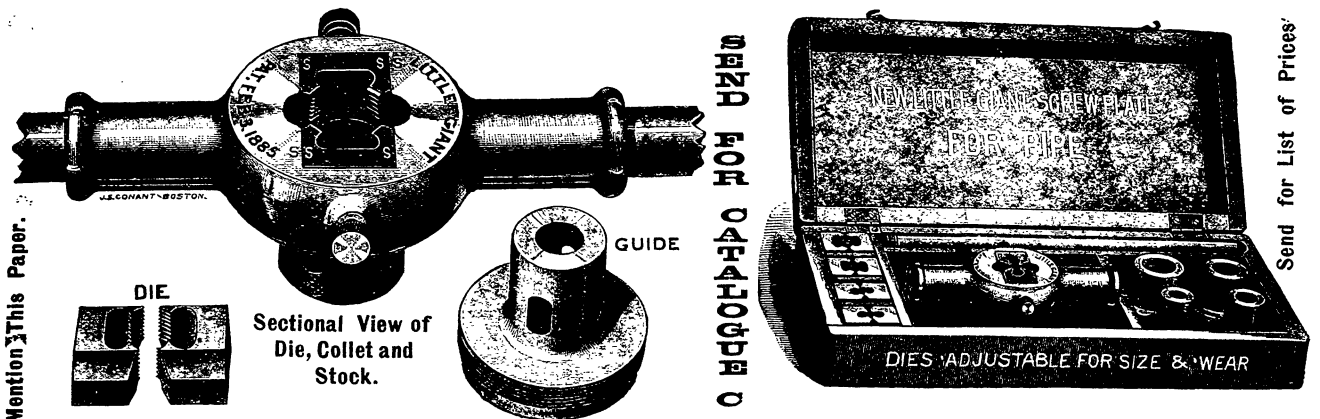
Manufactured by

ALBERT L. COLBURN,

4 Wall St., New Haven, Conn.

SEND FOR CATALOGUE.

# NEW LITTLE GIANT ADJUSTABLE DIE SCREW PLATE FOR PIPE.



To change from one size to another, simply screw out the guide, drop out the die, and replace with size die and guide required.

**PRACTICAL, SIMPLE AND DURABLE.**

MANUFACTURED BY  
**WELLS BROS. & CO.,**  
Greenfield, Mass., U. S. A.

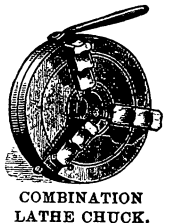
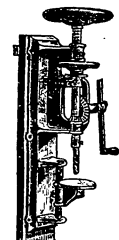
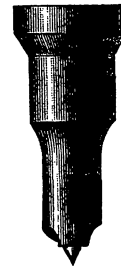
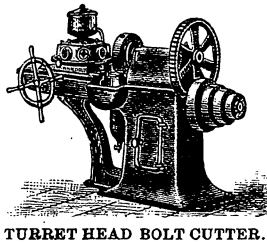
For description and prices of the tools illustrated herein, ask for the

**HARDWARE CATALOGUE**

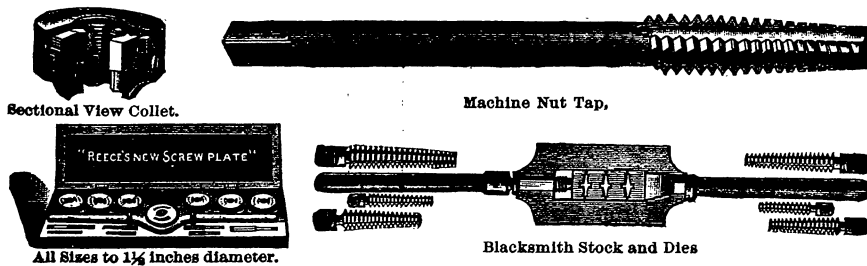
— OF —

**The Pratt & Whitney Co.,**

Hartford, Conn., U. S. A.,



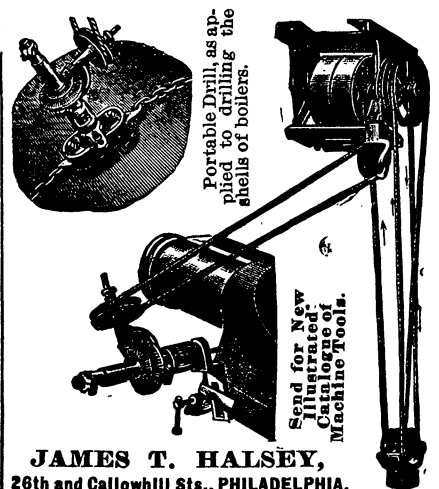
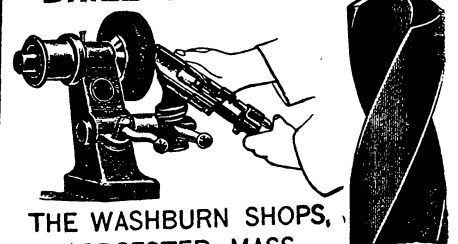
**AND MENTION THE ARTICLES IN WHICH YOU ARE INTERESTED.**



**BUTTERFIELD & CO., Derby Line, Vt.,**  
Manufacturers of SCREW-CUTTING TOOLS In Great Variety.  
WRITE FOR ILLUSTRATED CATALOGUE.



## DRILL GRINDER.



**DUNHAM NUT MACHINE CO.,**  
Unionville, Conn.,  
Manufacturers of  
**AUTOMATIC COLD PRESS NUT MACHINES**  
FOR MAKING CHAMFERED AND TRIMMED NUTS  
Correspondence Solicited.

# THE STANDARD TOOL CO., CLEVELAND, OHIO.

MANUFACTURERS OF

Increase Twist Drills, Reamers, Taps, Milling Cutters and Chucks.

Taper Shank  
Drills,  
St. Shank Drills,  
Screw-driver  
Bits,  
Reamers,  
Shell and Solid  
Taper Reamers.



Bit Stock Drills for Metal or Wood.



Wood-Boring Brace Drills, will cut off nails.

Hand Taps,  
Mach. Screw Taps  
"Standard" Drill  
Chuck,  
"Ellenwood" Drill  
Chuck,  
Sq. Shank Drills  
for Ratchets,  
Twist Drills for  
Blacksmiths'  
Presses

Sockets for  
Taper Shank  
Drills.

Reamers in  
all sizes.

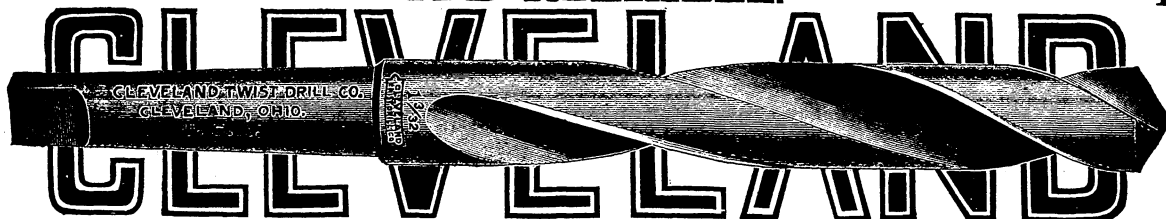
NEW YORK OFFICE, 33 CHAMBERS ST. Send for Catalogue.

1874

OLD RELIABLE.

1893

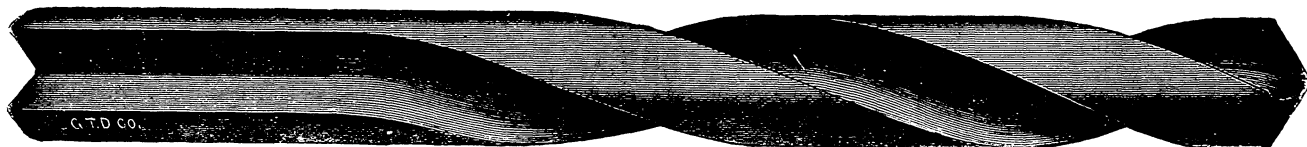
Send For Catalogue.



Write For Discounts.

Graham Twist Drill &amp; Chuck Co., Detroit, Mich., U.S.A.

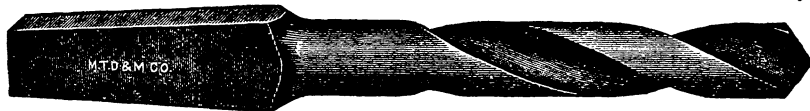
Sole Manufacturers of Graham's Patent Grooved Shank Twist Drills and Chucks.



Endorsed by Practical Mechanics everywhere. Send for Catalogue and Prices.

## Morse Twist Drill & Machine Co., NEW BEDFORD, MASS.

Manufacturers of Morse Pat. Straight-Lip Increase Twist Drills,



Bit Stock Drills, Solid and Shell Reamers, Drill Grinding Machines,

Milling



Cutters,

Beach's Patent Self-Centering Chucks, and Special Tools to Order.



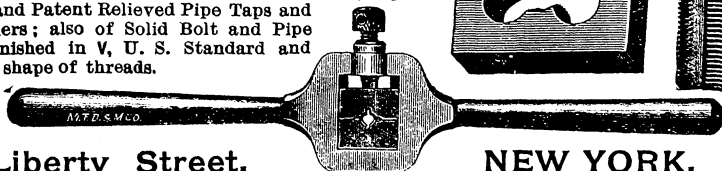
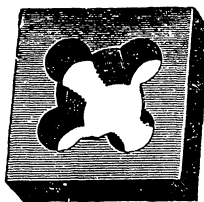
ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

## MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand,  
Blacksmith and Machine Screw Taps, Screw Plates, Tap  
Wrenches and Patent Relieved Pipe Taps and  
Pipe Reamers; also of Solid Bolt and Pipe  
Dies. Furnished in V. U. S. Standard and  
Whitworth shape of threads.



111 Liberty Street,

NEW YORK.

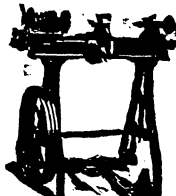
## Patent Foot Power Machinery

SCROLL SAWS, CIRCULAR SAWS, MORTISERS, LATHES, &amp;c.

For Carpenters, Builders, Cabinet Makers, and all Wood and Metal Workers. Catalogue free.

SENECA FALLS MFG. CO.,

255 Water St., Seneca Falls, N. Y.



## Stow Flexible Shaft

Invented and Manufactured by the  
Stow Manufacturing  
Co.,

Binghamton, N. Y.

Established in 1875.

For Tapping and Reaming Stay Bolt Holes in

BOILERS.



Portable Drilling.

## Thos. H. Dallett & Co.

York St. and Sedgley Ave., PHILA.

MANUFACTURERS OF  
Portable Drills, Hand  
Drills, Boiler Shell Drills  
Electric Motors specially  
adapted for driving Ma-  
chine Tools, Cranes, Ele-  
vators, Pumps, Presses and  
other machinery.

Electric Generators for installation of complete power plants.

## Stow Flexible Shaft Co., Limited,

26th, Callowhill &amp; Biddle Sts.

PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,  
TAPPING, REAMING  
and BORING MACHINES

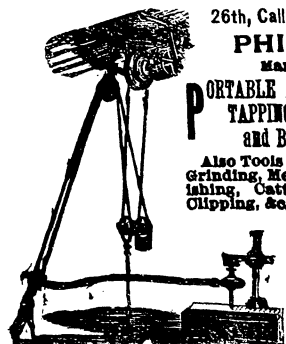
Also Tools for Emery Wheel  
Grinding, Metal and Wood Pol-  
ishing, Cattle Brushing and  
Clipping, &c.

Gen'l European Agents.

Bolling &amp; Lowe

2 Lawrence, Pountney Hill,

LONDON, ENG.

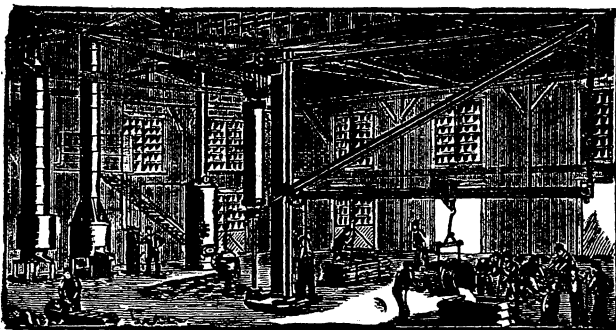


# ALL WE ASK.-

If you need a crane for any purpose, go and see **RIDGWAY STEAM-HYDRAULIC** in use. This will settle you. Look over the list. You know some of them, we guess. Don't fool your money away on inferior cranes. Neither can you afford to move goods by hand power in these times. Look at the List.

No mistake made following these:

Fraser & Chalmers.  
Otis Bros. & Co.  
Gaar, Scott & Co.  
Geo. V. Cresson Co.  
American Steel Wheel Co.  
Shickle, Harrison & Howard.  
The Sterling Co.  
Canda Mfg. Co.  
Aliquippa Steel Co.  
I. G. Johnson & Co.  
Montgomery Fur. Co.  
Reading Iron Co.  
Hoopes & Townsend.  
Valk & Murdoch.  
B. Atha & Ill'w'th Co.  
Hughes & Patterson.  
Sherman & Co.  
Murray Iron Works.  
Rensselaer Mfg. Co.  
Benwood Steel Co.  
Clinton I. & S. Co.  
Oliver I. & S. Co.  
Moorhead-McCleane.  
Jones & Laughlin.  
Spang S. & I. Co.  
Apollo S. & I. Co.  
Johnson Co.  
Cambria Iron Co.  
Old Dominion I. & S. Co.  
Standard Iron Co.  
Norristown Steel Co.  
Midland Steel Co.  
Farren & Co.  
Pearson & Co.  
Morton, Reed & Co.



Cut shows 5-ton Ridgway Crane in Foundry, Diamond State Iron Co., Wilmington, Del.

## THE IDEAL FOUNDRY CRANE.

Foreman of the largest and finest equipped foundry in the United States, if not in the world, says: "It is the greatest crane for a foundry I ever saw or heard tell of. Ours do all promised for them."

## A FACT—AND A CLINCHER.

No man needing Cranes who has gone to see ours in operation has failed to place his order with us for this wonderful machine.

## QUICK.

It does the work while other cranes are getting ready to do it. Is noiseless. No shocks or jars and is attached to ordinary steam supply. Any and all men around the place work it. Steam used is never missed.

### SEND FOR CIRCULAR.

Give pressure, capacity, radius and height of building and we will name prices.

**CRAIG RIDGWAY & SON, Coatesville, Pa.**

No mistake made following these:

Penna. Steel Co.  
Illinois Steel Co.  
National Tube Works.  
Henry Disston & Sons Co.  
Phoenix Iron Co.  
A. & P. Roberts Co.  
Passaic R. M. Co.  
Catasauqua Mfg. Co.  
Mahoning R. M. Co.  
Harrisburg R. M. Co.  
Harrisburg Car Co.  
Wm. Neal & Son.  
Atlantic Refining Co.  
E. & G. Brooke Iron Co.  
Wm. L. Bailey & Co.  
Glasgow Iron Co.  
W. W. Kurtz & Sons.  
Kilmer Mfg. Co.  
Port Henry Fur. Co.  
Akron Iron Co.  
Crane & Breed Co.  
Diamond S. Iron Co.  
J. W. Friend & Co.  
National P. & F. Co.  
West Superior I. & S. Co.  
Hartman Mfg. Co.  
Shoenberger & Co.  
Chester R. M. Co.  
Garwood Imp. Co.  
Blankley Bros. & Co.  
New Haven Wire Co.  
American Wire Nail Co.  
John Brennan & Co.  
Buffalo Cast Iron Pipe Co.  
John Q. Denny.

# THE WOODRUFF SYSTEM OF KEYING FOR MACHINERY

Does not require skilled labor to cut key way or fit key.

The peculiar way of inserting the key practically makes it part of the shaft.

A man will fit more than double the number of keys in a day than by the ordinary method.

Will save you from 50 to 75 % on the cost of your keying.

**ENDORSED BY MECHANICS AND ENGINEERS.**

Illustrated pamphlet containing a full description will be sent free on application.

**THE WOODRUFF MFG. CO., Hartford, Conn.**

Our Drills are Hot Forged. The best part of the steel IS NOT CUT OUT and thrown away.



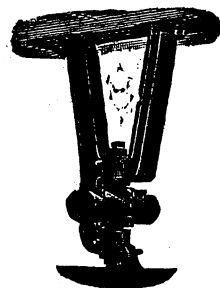
They are **TOUGHER, STRONGER, BETTER** than is possible to attain by milling. Catalogue and Discounts sent on application.

# When You Stop

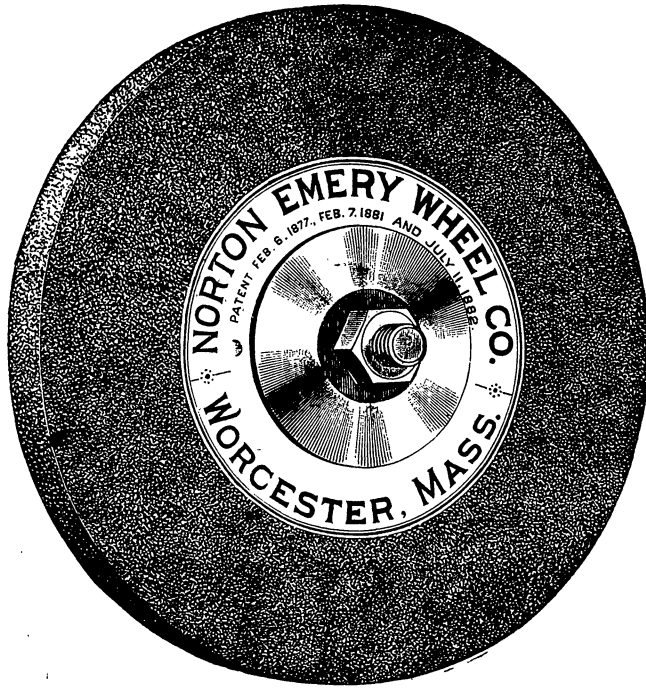
To make repairs wouldn't it be as well to buy the best Pulleys, Hangers, Journal Boxes, Wall Brackets, that are manufactured and that save you time and money? We think so, and would be glad to have you write.

**Ours Are the best for Shop Use, Remember.**

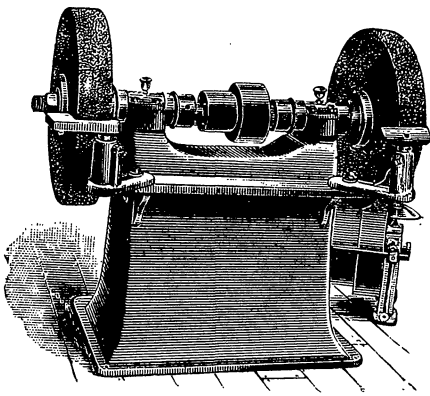
Manufacturers and Gen. J. W. FOLEY & CO., 329-337 W. Front St., Cincinnati, O.  
Founders.



## Norton Emery and Corundum Wheels.



Complete Illustrated CATALOGUE mailed FREE on application.



The Springfield Emery Wheel Co.,  
Bridgeport, Conn.

Western Agency, 125 So. Clinton St., Chicago, Ill.

**EMERY AND CORUNDUM WHEELS,**  
To Run WET or DRY.

Over 50 Different Sizes of  
Dry Grinders,

And over 200 different varieties of Emery  
Wheel Machinery. All goods guaranteed  
satisfactory.

SEND FOR CATALOGUE.

**MICHIGAN EMERY WHEEL CO.,** 194 Catherine St.,  
Detroit, Mich.

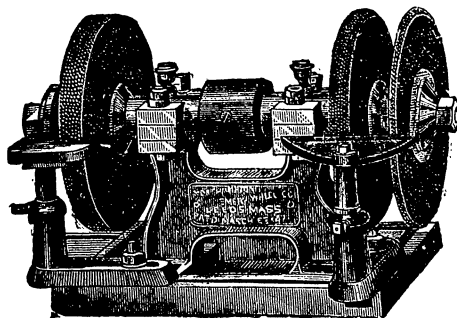
**SOLID EMERY AND CORUNDUM WHEELS,**  
**TO RUN WET OR DRY. SPECIAL SHAPES.**  
**PERFECTION SAW GUMMERS.**

Send for Price-List.

FOR SALE BY THE FOLLOWING AGENTS:

The Robinson & Cary Co., St. Paul, Minn.  
The Curtis & Co. Mfg. Co., Chicago, Ill.  
The Western Iron & Supply Co., St. Louis, Mo.

The McIntosh-Huntington Co., Cleveland, Ohio.  
The Hide Leather & Belting Co., Indianapolis, Ind.  
The Machinists' Supply Co., Rochester, N. Y.



ESTABLISHED 1887. CAPITAL \$100,000

**Northampton Emery Wheel Co.,**  
**LEEDS, MASS.**

And 20 South Canal St., Chicago,

MANUFACTURERS OF

**EMERY WHEELS**

—AND—

**EMERY WHEEL MACHINERY**

Of Best Quality.

Send for Catalogue. FACTORY AT LEEDS, MASS

**WE CAN SAVE YOU MONEY.**  
**HAMDEN CORUNDUM WHEEL CO.,**

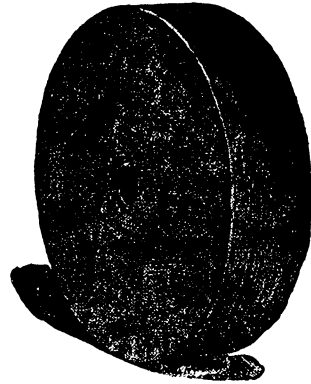
Write for Quotations.

**BRIGHTWOOD, MASS.**

D

## Solid Leather Wheels

**FOR POLISHING.**



Will outwear any other wheel  
Saves the continual expense of  
recovering. Pliable and elastic.  
Waterproof and will not burst.

**C. E. LE MASSENA & CO.,**

776 Broad Street.

NEWARK, N. J.

"INDEPENDENT OF ALL COMBINATIONS."

**THE**

**Huron Grindstone Co.,**

Port Austin, Mich.

MANUFACTURERS OF

Lake Huron Grindstones,  
Mounted Grindstones  
Scythe Stones, &c.

WRITE FOR PRICES.

**A POOR OIL STONE IS WORTHLESS.**

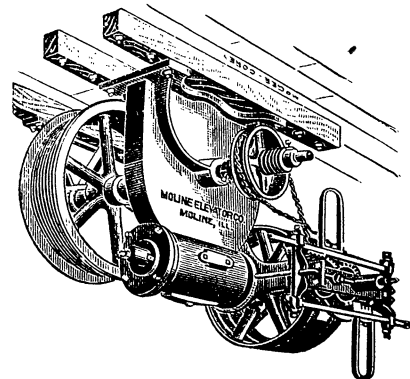


**PIKE'S**

Lily White Washita is  
warranted to give  
satisfaction.

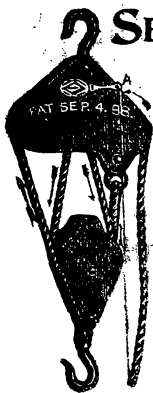
THE PIKE MFG. CO., PIKE STATION, N. H.

**MOLINE ELEVATOR CO.**



MANUFACTURERS OF  
**POWER ELEVATORS,**  
**HAND ELEVATORS**  
**and DUMB WAITERS.**  
WRITE FOR PRICES AND CIRCULARS.  
**MOLINE, ILL.**

**SELL THE BEST.**



**THE "SURE GRIP"  
Steel Tackle Block**

is taking the place of all other hoisting blocks.

Send for catalogue and discounts

**Fulton Iron & Engine Works,**

28 Brush St., Detroit, Mich.

ESTABLISHED 1852.



**Highest Efficiency.  
WESTON'S NEW  
TRIPLEX  
Chain Block**

far exceeds all predecessors. Send for Prof. Thurston's report of comparative tests of all chain pulley blocks.

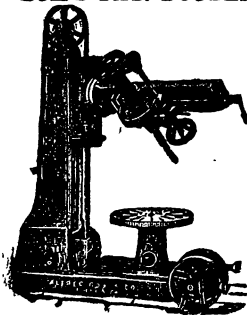
**The Yale & Towne Mfg. Co.  
STAMFORD, CONN.**

New York, 84-86 Chambers St.  
Chicago, 152-154 Wabash Ave.  
Philadelphia, 1120 Market St.  
Boston, 224 Franklin St.

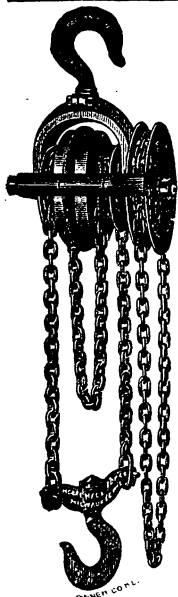
**Alfred Box & Co.,**

Front, Poplar and Canal Sts., Philadelphia  
Sole Manufacturers of

**BOX'S PAT. DOUBLE SCREW HOISTS.**



25,000 supplied in the United States exclusive of foreign trade; a record that tells its own story; a record of solid, substantial growth; extensive new works necessary to keep up with orders in our specialties; ample room now to build the heaviest class of Traveling and Jib Cranes of all sizes. Overhead Railways Trolleys, Special Hoisting Gear for home-made Cranes; also our Patent Radial Drills and Gang Drills, as used by bridge builders. Estimates furnished with photos. Correspondence solicited, or visit our works



**Moore M. & F. Co.,**

Milwaukee, Wis., U. S. A.,

Manufacturers of

Moore's Anti-Friction

Differential

Chain

Pulley

Block.

A New Movement!  
A Perpetual Compound Lever!  
Powerful, Simple and Durable!

One Man Can Lift to the Full Capacity of the Block.

Self-Sustaining at Any Point.

The Block Always Hangs Plumb.

Send for descriptive price-list, mentioning this paper.

**Salem Foundry and Machine Shop**

BUILDERS OF

**ELEVATORS**

SALEM, MASS.

**A WORD TO THE WISE.**

**Our ELECTRIC MOTORS**

are operating numerous

**IRON AND STEEL MILLS AND MACHINE SHOPS ECONOMICALLY,  
SUCCESSFULLY AND SATISFACTORILY.**

WRITE FOR OUR ILLUSTRATED CATALOGUE.

**THOMSON-HOUSTON MOTOR COMPANY**

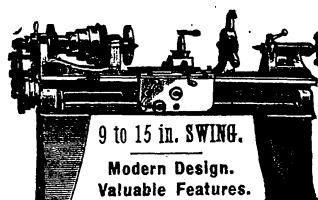
BRANCH OFFICES:

44 Broad St., New York.  
620 Atlantic Ave., Boston, Mass.  
173 & 175 Adams St., Chicago, Ill.

509 Arch St., Philadelphia, Pa.  
Fifth and Race Sts., Cincinnati, O.  
401-407 Noble St., St. Paul, Minn.  
Masonic Temple, Denver, Colo.

Gould Building, Atlanta, Ga.  
133 F St., N. W., Wash., D. C.  
15 First St., San Francisco, Cal.

All business outside the United States transacted by THE THOMSON-HOUSTON INTERNATIONAL CO.,  
44 Broad Street, New York.



9 to 15 in. SWING.

Modern Design.  
Valuable Features.

**SEBASTIAN LATHE CO.**

113-115 Culvert St., - Cincinnati, O.

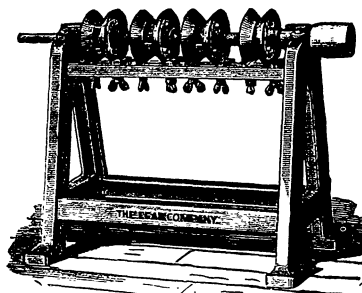
Manufacturers of Foot and Power

**ENGINE AND SPEED LATHES,**

Tools and Supplies. Catalogues Free.

**LATHES.**

**ISRAEL H. JOHNSON, JR., & CO., - PHILADELPHIA.**



**Improved Cornering or Rounding Machine.**

Designed for finishing shafts, poles, and all kinds of bent stock where the diameter varies. Extra jointing head and table furnished when desired.

The Largest Line in the  
World of Wood Working Machinery. Any want taken care of.

**J. A. FAY & Egan Co.,**

179 to 199 W. Front Street,

CINCINNATI, OHIO, U. S. A.

360 medals awarded in the U. S.  
and abroad. "Grand Prix."  
Paris, 1889.

**EDWIN HARRINGTON, SON & CO.,**

ESTABLISHED 1867.

1508 Pennsylvania Avenue,

PHILADELPHIA, PA.,

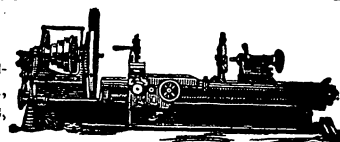
— MANUFACTURERS OF —

**METAL - WORKING - TOOLS.**

Double Chain Screw Pulley Blocks or Hoists.

Complete equipment of overhead Railways for shops, foundries, warerooms, &c., consisting in part of Turntables, Switches, Plain and Geared Trucks, &c.

Gear Cutting up to -ft. diam. a specialty.



EXTENSION LATHE.

**KEASEY PULLEY Wood Split Pulley.**

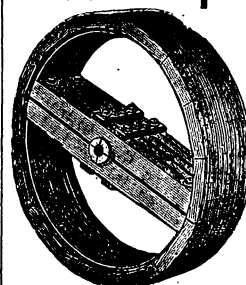
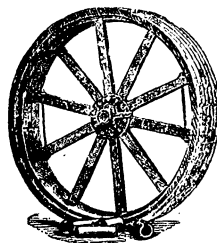
Is a Split Pulley. Has narrow Arms. An Iron Hub. Better surface and will transmit more power than an Iron Pulley. To try them is to use no other.

**HAVE YOU  
TRIED THEM?**

If not, do so. It's to your interest.

Manufactured only by  
**THE GREAT WESTERN  
PIN CO.,**

**TOLEDO, OHIO.**



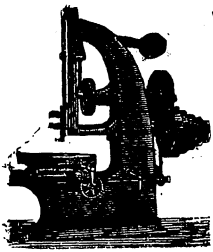
**Strongest,  
Lightest,  
Simplest,  
Cheapest**

Wood split pulley in the world. Satisfaction guaranteed. Write for price-list and descriptive Catalogue. Address

**REEVES PULLEY CO.,**

1220 E. 7th Street, - COLUMBUS, IND.  
New York Agents,  
Patterson, Gottfried & Hunter, 116-150 Centre St.



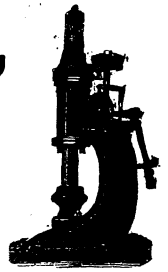


# WM. SELLERS & CO.,

INCORPORATED,

PHILADELPHIA, PA.,

—MANUFACTURERS OF—



Improved Machine Tools for Working Iron and Steel,  
High Speed Power Traveling and Swing Cranes,  
Injectors, Locomotive Turn Tables, Shafting, &c., &c.  
Testing Machines, under patents of A. H. Emery.

Prices, Descriptive Matter, &c., Furnished on Application.

## MORSE ELEVATOR WORKS.

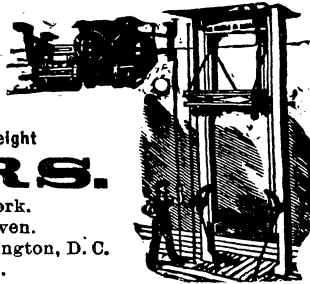
### MORSE, WILLIAMS & CO.,

Manufacturers and Builders of

Electric, Hydraulic, Belt and Hand Power Passenger and Freight

## ELEVATORS.

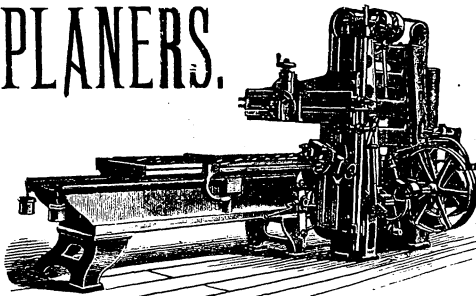
1105 Frankford Ave., Philadelphia, 108 Liberty St., New York.  
83 Lincoln St., Boston, 82 Church St., New Haven.  
425 Spruce St., Scranton, Pa., 116 E St., N. W., Washington, D. C.  
1118 Chamber of Commerce Building, Chicago, Ill.



## OPEN SIDE IRON PLANERS.

A FEW READY FOR  
IMMEDIATE DELIVERY.

WRITE TO US DIRECTLY FOR  
CATALOGUE AND PRICES.



## THE DETRICK & HARVEY MACHINE CO., Baltimore, Md

## FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

Twenty-second and Wood Streets, Philadelphia, Pa.

Shafting, Gearing, Self-Oiling Bearings, Friction  
Pulleys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manilla and Cotton  
Rope Driving. Looms, Cotton and Woolen Machinery for Winding, Spooling,  
Reeling, Beaming, Warping, Dyeing, Sizing, Scouring, &c.

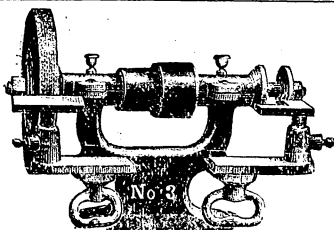
CELEBRATED

## ELECTRIC TRANSMITTERS.

FOR HAND POWER,

## ELEVATORS.

SMITH HILL CO., Quincy, Ill.



Paper Box, Buffing, Polishing, Electrotyping  
and Emery Wheel Machinery.

Power and Foot Presses. Drill Presses.

Herrick & Cowell, 37 Artisan Street,  
NEW HAVEN, CONN.  
Send for Catalogue.

## ZELLER'S AUTOMATIC GATES

—FOR—

## ELEVATORS.

Self-Opening.  
Self-Closing.

SIMPLE and DURABLE.

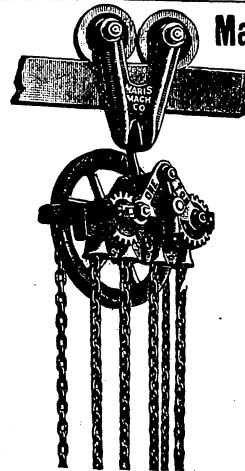
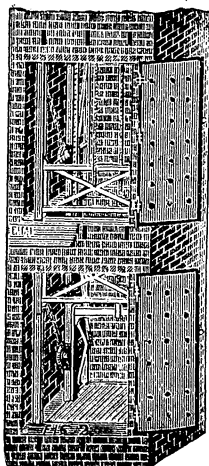
Send for Illustrated  
catalogue and prices.

RICHMOND

SAFETY

GATE CO.,

RICHMOND, IND.



## Maris & Beekley, PHILA., PA.

MANUFACTURERS OF

## CRANES,

Power Bridge  
Cranes, Hand  
Bridge Cranes,  
Jib Cranes.

Portable Hoist.  
Holds load at any  
point.

Overhead Track,  
Trolleys,  
Switches

## J. G. SPEIDEL,

807 & 809 CHERRY STREET,  
READING, PA.,

Patentee and Manufacturer of the  
celebrated

**Economic Safety Hoist,**  
Has been awarded the John Scott  
Medal and Premium by the Franklin  
Institute of the City of Philadelphia  
for Highest Efficiency, Simp-  
licity and Durability.

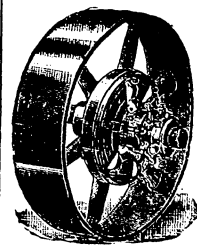
One man can lift two to three times  
as fast as with any other self-holding,  
chain hoist. It has two speeds, is  
built strong and durable, and guaran-  
teed to give satisfaction.

TRAVELING AND SWING CRANES.  
Overhead Framway, complete with  
Trolleys, Switches, &c.

Portable Derricks & Hand Elevators  
Will take contracts for light and  
medium heavy machinery. Send for  
illustrated catalogue and price-list.



## The Moore & White Co.,



Clutch Pulley.

Paper

Machinery,

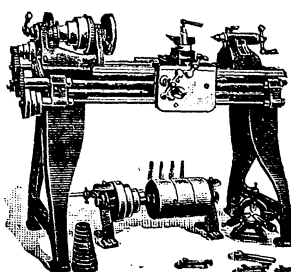
Friction

Clutches, &c.

N. E. Cor. 15th AND LEHIGH AVE.,  
PHILADELPHIA, PA.

Latest Improved Screw Cutting Foot and Power

## LATHES

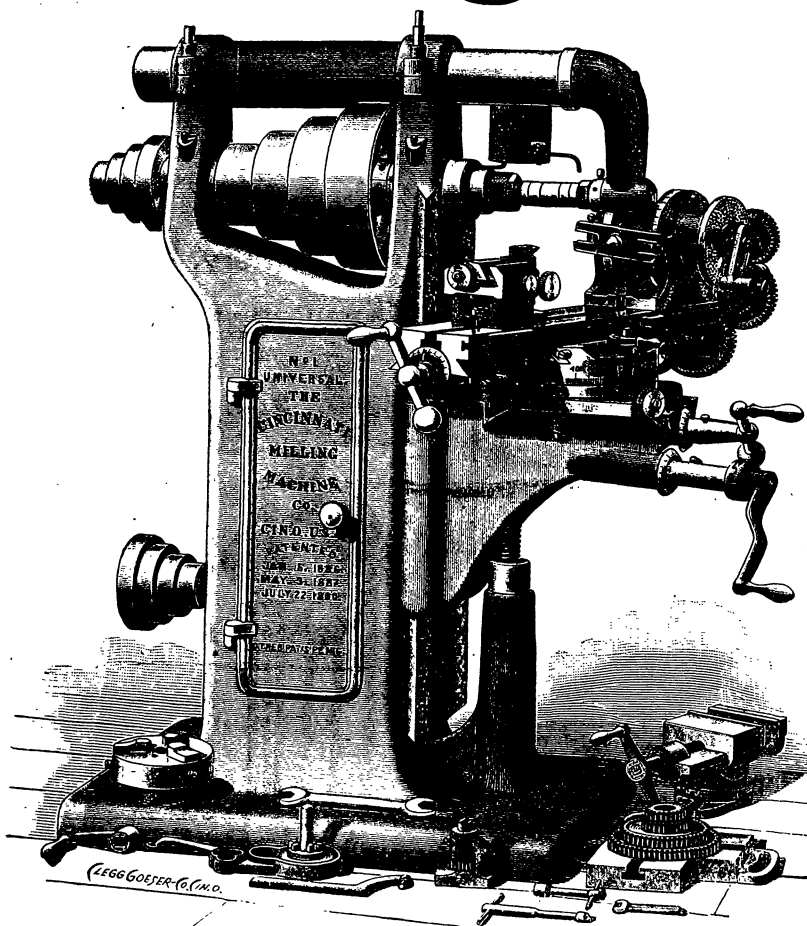


from 8 to 26  
inch swing.  
Catalogues  
mailed upon  
application.  
Correspon-  
dence solicited.

THE  
SEBASTIAN  
MAY CO.,

150-152 High-  
land Ave.,  
Stoney, Ohio

# Milling Machines.



**N**O UNIVERSAL Milling Machine has been brought out in years possessing the many improvements embodied in our No. 1.

Its great range of work, capacity, rapidity of adjustment, and ease of operation all combine to make it the most advanced type of its class.

Possessing as it does more valuable and practical features, it commends itself to those having in view the purchase of a first-class tool costing no more than others.

Full and complete details will be gladly sent upon request. Address

The Cincinnati Milling Machine Co.,

CINCINNATI, OHIO, U. S. A.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUB

## "RICHES AND HAPPINESS"

The two things we are all looking for. We have a good receipt for you to follow: Buy Nubian, you'll get "the best black on earth" and be happy, and incidentally we'll accrue a little filthy lucre, and that, to tell you the truth, is what we are most interested in. **Bonnell's Nubian** is made in all grades from cheapest to best and every grade guaranteed. If you now use asphaltum, write us, it will pay you.

HALL & CARPENTER, Phila., Pa.  
BROWN, McCURE & WALES, Boston, Mass.  
TAYLOR GOODRICH, San Francisco, Cal.

THE NUBIAN IRON ENAMEL CO.,

33-35 Nubian Ave.,  
CRAGIN, ILL.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUB

## NOW IS THE TIME TO BUY SCYTHE STONES.

We are sole manufacturers of the celebrated brands. Western Red End, Star, Diamond, Clear Grit, Blue Bank and Quinnebog.

Write for Catalogue C.

The Cleveland Stone Co.  
CLEVELAND, O.

GEORGE E. BELL,

Successor to E. M. HYDE and UNION STONE CO.,

—SOLE AGENT—

Waltham Emery Wheels,  
WALPOLE MILLS TURKISH EMERY.

Dealer in Platers' and Polishers' Machinery and Supplies of all kinds. Foundry Supplies.

36 JOHN ST., NEW YORK.

**Screws and Screw Making** With a Chapter on the Milling Machine; a complete treatise on Screw Making in all its branches, embracing most recent methods, and containing the reports which originated modern standard screw threads. With 95 illustrations. 12mo, cloth.....\$1.25  
or Sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.

## IT'S TO Your Advantage

to correspond with us regarding emery wheels.

Grant Corundum Wheel Mfg. Co.

CHESTER, MASS.

## POWER BOILER FEED PUMP.

From 2 to 80 horse-power. Neat in design. Self-contained easy motion. Durable and reliable. Strong built, large bearings.

Send for Catalogue and Prices and mention this paper.

C. O. LUCAS & CO..

Greenville, Ohio.

FOR SALE.

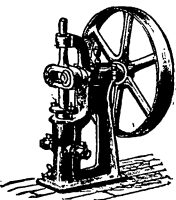
Punching and Shearing Machinery.

Hand and Belt Power.

Boiler Makers' Rolls.

NEW DOTY MFG. CO.,

Janesville, Wisconsin.

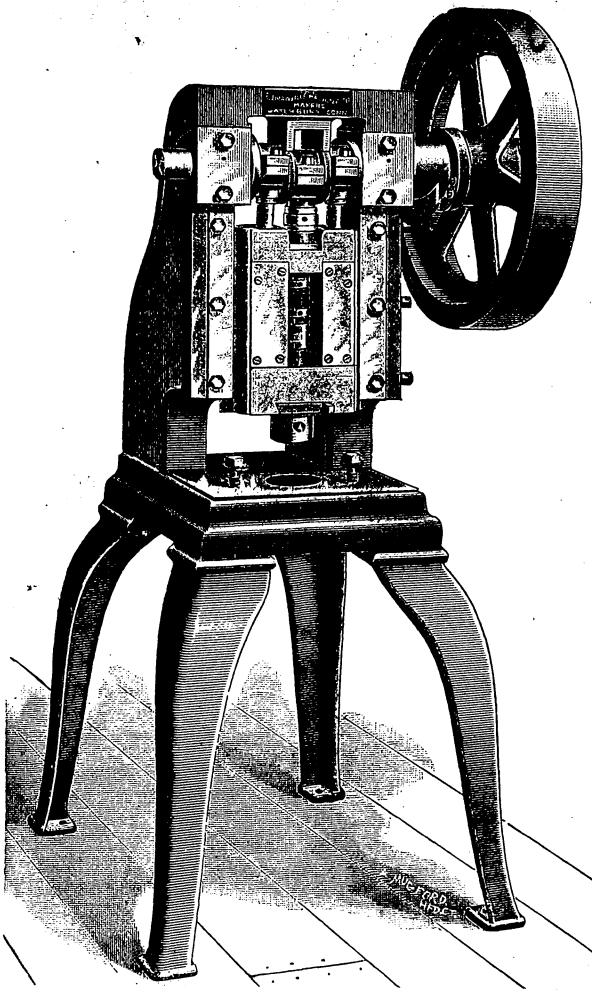


## Wanted, Contracts

For building mining, blast furnace, rolling mill and factory machinery, for making castings for cable and electric railroads, or any special line of castings. Address

MAHONING FOUNDRY AND MACHINE SHOP,

Danville, Pennsylvania.



# AT ONCE

We have in stock a number of *Power Presses* of our own manufacture and fully guaranteed, which can be **DELIVERED IMMEDIATELY.**

**PARTICULARS ON APPLICATION.**

**The E. J. Manville Machine Co.,**  
WATERBURY, CONN.

SPECIAL  
AUTOMATIC  
MACHINES.  
—  
POWER PRESSES.  
—  
WIRE-WORKING  
MACHINES.

THE  
Lodge & Shipley  
Machine Tool  
Co.,

107-113 Culvert St., - CINCINNATI, O.

# DETAILS

OF

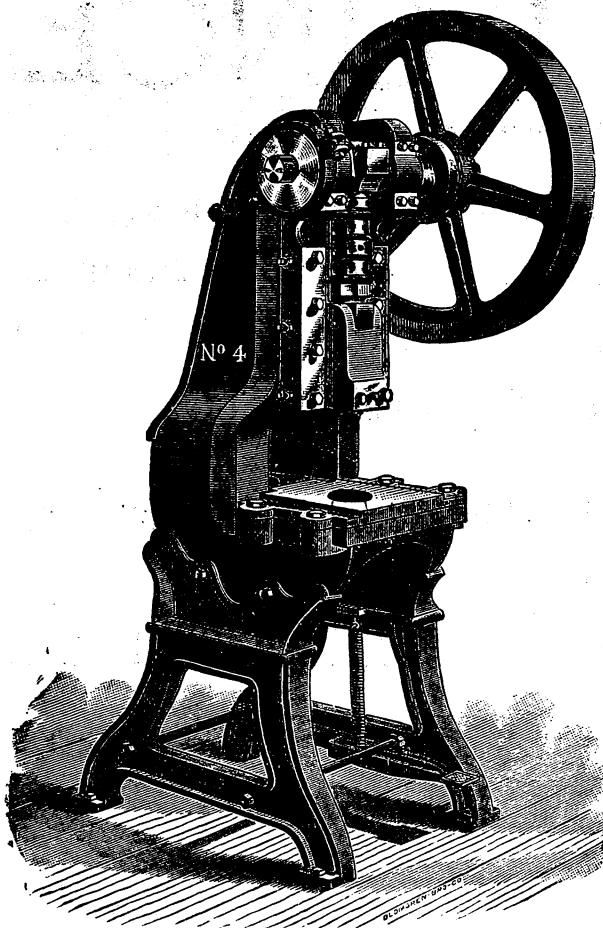
# ENGINES

AND

# PUMPS

May be manufactured at a greatly reduced cost on our

# ENGINE DETAIL MACHINE.



## IMPROVED POWER PRESSES.

- ☞ Six different sizes.
- ☞ Quick Acting.
- ☞ Friction Brake.
- ☞ Stiff and Rigid.
- ☞ Generous Wearing Surfaces.
- ☞ For Blank Cutting.
- ☞ For Perforating.
- ☞ For Forming.
- ☞ For Combination Die Work and many other purposes.

### WORKS, CINCINNATI.

CHICAGO STORE, 68 and 70 S. Canal St.  
 NEW YORK STORE, 64 Cortlandt St.  
 PITTSBURGH STORE, Market and Water Sts.  
 ST. LOUIS STORE, 823 N. 2d St.  
 BOSTON OFFICE, 23 & 25 Purchase St.  
 PHILADELPHIA OFFICE, 19 N. Seventh St.  
 SAN FRANCISCO OFFICE, 21 & 23 Fremont St.

# THE LODGE & DAVIS MACHINE TOOL CO.

## CHANGE IN PRICES.

In accordance with our practice of reducing the prices of all our products as fast as is consistent with good quality and cost, we have to-day determined upon another change—the price of the **No. 3 Universal Milling Machine** is again reduced.

The prices of the Universal Grinding Machines and the No. 1 Universal Milling Machine were reduced, respectively, Jan. 14th, and Feb. 10th.

Particulars given on application.

BROWN & SHARPE MFG. CO.

PROVIDENCE, R. I., Feb. 23, 1893.

# BARGAINS

## IN GOOD

### Second-Hand Tools.

1 13 x 5 Pratt & Whitney Plain Lathe.  
 1 15 x 6 Blaisdell Lathe.  
 1 15 x 6 Barnes "  
 1 15 x 8 "  
 1 15 x 8 Perkins "  
 1 17 x 8 Lodge & Davis Lathe.  
 1 18 x 6 New Haven Lathe.  
 1 18 x 7 Lathe & Morse Lathe.  
 1 20 x 7 Thayer & Houghton Lathe.  
 1 20 x 8 Lathe & Morse Lathe.  
 1 20 x 8 Steptoe Lathe.  
 1 26 x 12 Powell Lathe.  
 1 36 x 20 Perkins "  
 1 96-in. Triple Geared Lathe  
 1 20-in. Lodge & Davis Shaper.  
 1 24-in. "  
 1 24-in. Hender Shaper.  
 1 26-in. Lodge & Davis Shaper.  
 1 16 x 16 x 3 Walters Planer.  
 1 18 x 18 x 4 Putnam "  
 1 22 x 22 x 5 Pease "  
 1 24 x 24 x 6 "  
 1 30 x 30 x 5 Cove "  
 1 32 x 32 x 8 New Haven Planer.  
 1 Double Head National Bolt Cutter.  
 1 Slab Miller.  
 1 30-in. Gould & Eberhardt Gear Cutter.  
 1 No. 3 Brainard Gear Cutter.  
 1 Niles Milling Machine.  
 1 26-in. Pratt & Whitney Turret Lathe.  
 1 5-ft. Plain Radial Drill.  
 20 in., 24 in., 25 in., 30 in. and 32 in. Drill Presses

**The Lodge & Davis**  
**Machine Tool Co.,**  
**WORKS, Cincinnati, Ohio.**

**NEW YORK, 64 Cortlandt Street.**  
**CHICAGO, 68 & 70 So. Canal Street.**  
**ST. LOUIS, 823 No. Second Street.**

## REMOVAL,

### MAY 1ST, TO

### 14 DEY ST.

Special Sale previous to our removal of  
 the following  
**MACHINE TOOLS, SECOND HAND.**

Engine Lathe, 48 in. x 10 ft. Old Style. Low price  
 24 in. swing, 12 ft. bed, with Cpd. Rest  
 and Cross Feed, Fitchburg. A1.  
 " " 24 in. x 5 1/2 ft. between centers, Hollow  
 Spindle, 1 1/2 in. A1 order.  
 " " 20 in. x 8 ft. Compound Rest and Cross  
 Feed, Fitchburg. A1.  
 " " 20 in. x 18 ft., Compound Rest and  
 Chuck, complete Lathe & Morse  
 18 in. x 8 ft. complete. New Haven.  
 " " 18 in. x 5 ft. Hollow Spindle, 1 1/2 in.  
 " " 16 in. swing, 8 ft. bed, complete, with  
 Chuck. A1.  
 " " 14 in. x 6 ft., complete, Fitchburg.  
 Brass Lathe, 15 in. x 5 ft. Turret and Chasing Bar.  
 Planer, 20 in. x 4 ft., White, mb. Good.  
 " 21 in. x 4 ft., Old Style. Lw price.  
 " 23 in. x 4 ft., Wood & Light. Good.  
 " 24 in. x 5 ft., New Haven, Good.  
 " 30 in. x 8 ft., Heavy Pattern. Good as new.  
 Shaper, 8 in., Crank, Gould. Good.  
 " 13 in., " Ex. heavy. Good.  
 " 14 in., Trav. Head, Fitchburg. Latest Pattern.  
 " 15 in., Friction, Hender "Improved."  
 " 20 in., Crank, Ex. heavy. Good.  
 Upright Drill, 20 in., Wheel Feet. Good.  
 " 30 in., with Back Gears. Auto. Feed,  
 Lever Feed and Reverse for Tap-  
 ping, Extra power. A1.  
 " 32 in., complete, same as 30 in.  
 Slotting Machine, 8 in., Modern Style, with Auto.  
 Feeds and Quick Return. A1.  
 Screw Machine, 15-16 in. hole, Back Gears, Auto.  
 Feed, with Chuck and To is com-  
 plete, Jones & Lamson. A1.  
 " 1 1/2 in. hole, Chasing Bar and Auto.  
 Feed, complete. Brown & Sharpe.  
 " 2 1/2 in. hole, Clutch Gears, Chasing  
 Bar, Auto Feed and complete  
 with Chucks and Tools; Jones &  
 Lamson. A1.  
 Vertical Turret Chucking Machine, "Brown & Sharpe"  
 Punch Presses, Latest Pattern, Standard sizes.  
 Boiler Bending Rolls, 8 ft. 2 in., with Hinged Hous-  
 ing and all Latest Improvements. Good as new.

**J. J. McCabe,**  
**68 Cortlandt St., New York.**  
 Successor to E. P. Bullard's New York  
 Machinery Warerooms.

**BARGAINS.**  
**Second-Hand Machinery. Good Condition.**  
 1 2500 lb. Double Frame Steam Hammer, F'd'k Miles.  
 1 250 lb. Justice & Shaw Dead Stroke Hammer.  
 1 20 in. x 10 ft. Field Engine Lathe.  
 1 18 in. x 8 ft. Field Engine Lathe.  
 1 15 in. x 6 ft. Blaisdell Engine Lathe.  
 1 Bishop Planer, 24 in. x 24 in. x 6 ft.  
 1 Lodge & Davis Planer, 25 in. x 25 in. x 6 ft.  
 1 Wm. Sellers & Co. Planer, 36 in. x 24 in. x 16 ft.  
 1 Bishop Planer, 48 in. x 24 in. x 7 1/2 ft.  
 1 2 in. x 20 ft. Sellers Double Headed Speed Lathe.  
 1 No. 3 Brown & Sharpe Universal Miller.  
 1 Small Pond Index Milling Machine.  
 1 40 in. Schumacher Drill Press, B. G. & P. F.  
 1 28 in. Schumacher Drill Presses, B. G. & P. F.  
 1 Power Punch, capacity 5/8 in. hole in 1/2 in. iron.  
 1 20 in. x 4 1/2 in. People's Works Horizontal Engine.  
 1 10 in. x 21 in. People's Works Horizontal Engine.  
 1 10 in. x 12 in. People's Works Vertical Engine.  
 1 8 in. x 20 in. Corliss Horizontal Engine.  
 6, 8, 10, 15, 25 and 40 H.P. Hoisting Engines.  
 1 30 H.P. Vertical Boiler, 42 in. x 10 ft.  
 1 Davidson Steam Pump, 12 in. x 8 in. x 14 in.  
**L. F. SEYFERT'S SONS,**  
**437-441 N. Third St., Philadelphia, Pa.**

## METAL WORKING

# MACHINERY.

**All kinds.**  
**NEW AND SECOND HAND.**

**600 Machine Tools in**  
**Stock.**

Send for lists of Second-hand Machin-  
 ery and Secure Bargains.

**PRENTISS TOOL & SUPPLY CO.,**  
**115 Liberty Street, NEW YORK.**  
**59 South Canal Street, CHICAGO, ILL.**

PLANER, 30 x 30 x 6. Rebuilt.....\$275.00  
 LATHE, 18 x 6. Good as new..... 145.00  
 17 x 8, Pond. Fair order..... 125.00  
 DRILL PRESS, 28 in. B. G. S. F. Nearly new... 185.00  
 " 26 in. Plain. Good order..... 85.00  
 " " Back Geared, wt. 1000 lbs. New. 130.00  
 FORG'G DROP, 100-lb. Hammer, New Design. 160.00  
 WIRE STRAIGHTENER and Cutter, Semi-Aut. 60.00  
 BOLT CUTTER New Head and Dies 3/4 to 1 1/2 in. 175.00  
 10 x 12 ENGINE. Fair order..... 100.00  
 7 x 9 Splendid order..... 85.00  
 POWER PUNCH PRESSES.....\$75.00 and upward.

**AMER. TOOL WKS., Cleveland, O.**

## SECOND-HAND

### MACHINISTS' TOOLS.

1 Planer, planes 18 ft. 48 in. x 39 in  
 1 Planer, planes 6 ft. 32 in. x 25 in.  
 1 Planer, planes 3 ft. 24 in. x 24 in.  
 1 Planer, planes 4 ft. 24 in. x 24 in.  
 1 Planer, planes 4 ft. 20 in. x 20 in., and chuck.  
 1 Engine Lathe, 16 ft. bed, 34 in. swing, for Boring  
 and Turning.  
 1 18 ft., 30 in.; 1 18 ft., 24 in. Lathe.  
 1 Engine Lathe, 13 ft. 6 in. 21 in. Betts Lathe.  
 1 12 ft. 22 in. New Haven Lathe. Good.  
 1 Rack Cutting Machine, cuts 1/2 in. wide, 48 in. long.  
 1 Pratt & Whitney Cushioned Hammer.  
 1 No. 3 Geared Stiles Power Press.  
 1 96-in. Back Geared New Haven Drill.  
 1 Small "Eureka" Steam Hammer.  
 1 9-in. Gould Crank Shaper.  
 And various other tools.

**New York Machinery Depot**  
**Bridge Store No. 16, on Frankfort St., New York**

## New and Second-hand Tools.

2 22 x 8 Engine Lathes, new.  
 3 22 x 10 " " "  
 1 22 x 12 " " "  
 1 18 x 8 " " "  
 1 28 x 8 " " " second hand,  
 1 62-in. Radial Drill, new.  
 1 24 x 8 Planer, new.  
 1 Pratt & Whitney No. 3 Lincoln Miller, second-hand.  
 For special prices address  
**Lodge & Shipley Machine Tool Co.,**  
**107-113 Culvert St., Cincinnati, Ohio.**

**FOR SALE.**  
 Fitchburg Machine Co. Vertical Automatic  
 Engine, 14 in. x 14 in., and a pair of same make  
 and size with reversing motion.  
**F. McSWEGAN & SONS,**  
 Dover St. and Franklin Square, N. Y.

# A

# STANDING

# INVITATION.

One touch of nature makes the whole world  
 kin,"

Even to the 99th degree,

And we invite **YOU ALL**, when pur-  
 chasing tickets to the

## COLUMBIAN EXHIBITION,

to buy your tickets

VIA

## PHILADELPHIA,

And when you have visited the

## CRADLE OF LIBERTY

AND THE

## GRAVE OF FRANKLIN,

both of which are to be seen in the

## QUAKER CITY,

Come round to our office, within three  
 blocks of the above attractions, and let us  
 have a friendly talk about machinery.

We are **Manufacturers' Special Agents**,  
 and can save you money on any ma-  
 chinery purchase

**For Motive Power,**  
**For Iron Working,**  
**or for Wood Working.**

And verily, when we have reasoned with  
 you, and you have returned to your sev-  
 eral homes, you will say each unto his  
 wife, my trip hath not been unprofitable.

**Pennsylvania Machine Co., Ltd.,**

**29 and 31 N. SEVENTH ST.,**

**PHILADELPHIA, PA.**

## FOR SALE.

2 Horizontal Tubular Boilers, 100 H.-P.  
 1 Horizontal Tubular Boiler, 80 H.-P.  
 2 Upright Corliss Boilers, 150 H.-P.  
 1 Locomotive Fire Box Boiler, 50 H.-P.  
 1 Horizontal Slide Valve Engine, 16 x 36.  
 2 Large Steam Fire Pumps.  
 Several Boiler Feed Pumps.  
 Write for prices.  
**D. B. CRUICKSHANK,**  
**243 Dyer street, Providence, R. I.**

## BARGAINS.

16 in. x 36 in. Corliss Engine.  
 12 in. x 24 in. Corliss Engine.  
 20 in. x 30 in. Plain Slide Valve.  
 12 in. x 15 in. Plain Slide Valve.  
 14 in. x 16 in. Vertical Engine.  
 12 in. x 14 in. Vertical Engine.  
 60 in. x 18 ft. Horizontal Boiler. New.  
 30 in. x 12 ft. Lathe.  
 15-ton Ice Plant.  
 Large Stock of New Engines, Boilers, Machine.  
 Tools and Supp'ies.  
**FRANK TOOMEY,**  
**131 North Third St., Philadelphia, Pa.**

## FOR SALE CHEAP.

- 1 35 H.-P. Straight Line Engine. Good order.
- 1 2 H.-P. Engine and Boiler, C. P. Willard.
- 1 7 H.-P. Engine and Boiler, Fitchburg.
- 1 3 H.-P. Engine and Boiler, Baxter.
- 1 50 H.-P. Engine, Woodbury. First-class.
- 1 each 4 1/2, 5 and 8 H.-P. Engine and Boiler.
- 2 10 H.-P. Engines, Woodbury & Booth.
- 1 5 H.-P. Engine. Cheap.
- 1 15 H.-P. Engine. Good and Cheap.
- 3 7 H.-P. Boilers, Vertical. Cheap.
- 1 5 H.-P. Engine and Locomotive Boiler. Cheap.
- 1 10 H.-P. Engine and Locomotive Boiler. Cheap.
- 1 15 H.-P. Engine, Woodbury & Booth.
- 1 20 in. x 14 ft. Lowell Lathe. Heavy. Fair order.
- 1 20 in. x 8 ft. Gleason Lathe. Good order.
- 1 18 in. x 6 ft. Pond Lathe. Fair order.
- 1 17 in. x 6 ft. Putnam Lathe. Fair order.
- 1 6 in. x 16 ft. Lathe. Cheap.
- 1 13 in. x 5 ft. N. Y. E. Co. Lathe. Good order.
- 1 20 in. x 20 in. x 5 ft. Putnam Planer. Good order.
- 1 22 in. x 22 in. x 5 ft. Putnam Planer. Good order.
- 1 Sensitive Drill, State.
- 1 Strong Lever Drill. Good order.
- 1 Large Upright Drill. Old style. Cheap.
- 1 B. & S. Screw Machine, 8 in. swing. Good order.
- 1 B. & S. Head Finisher. Good as new.
- 1 B. & S. Head Slitter. Good as new.
- 1 16 in. Wood Lathes, complete with countershaft.
- 1 Chair Round Machine with countershaft.
- 1 No. 5 Boston Blower. Good order.
- 1 Gas Blast Furnace. Nearly new.
- 2 Jig Saws.
- 1 Shaper. Graham. First-class.
- 1 Double Head Shaper.
- 2 Single Head Shapers.
- 1 Chuck and Heads for Chair Rounds.
- 1 Gear Cutter, Gould. In good order.
- 1 200 Light Dynamo. Good order.
- 1 Shear and Punch combined. Light machine. New.
- 1 48 in. Boring Lathe. Good as new.
- 1 36 in. Cupola. Blower, Rattler and Ladles. Good.
- 1 Power Chain Hoist, with Heavy Chain, complete.
- 1 36 in. Band Saw.
- 1 24 in. Buzz Planer. Nearly new.
- 1 24 in. Pony Planer.
- 1 Boring Machine.
- 2 Wood Frame Saw Tables.
- 2 Horizontal Boring Machines.
- 1 Rowley & Heman Three-Sided Moulder.
- 1 H. B. Smith Double Head Tenoning Machine.
- 1 24 in. Planer and Matcher.
- 1 Rowley & Heman Power Mortiser.
- 1 H. B. Smith Three-Sided Moulder.
- 1 Sand Bed Machine.
- 2 Sand Drums.
- 1 Knapp Dovetailing Machine.
- 1 Steam Pump. Good order.

Send for Complete List of New and Second-Hand Machinery for Prompt Delivery.

**W. P. DAVIS,**

Rochester, N. Y.

## CORLISS,

Wright, Porter-Allen, Buckeye and Slide Valve Engines, Boilers, Pumps, &c.

- |  |                              |
|--|------------------------------|
| 20 x 18 Corliss Engine.  | 16 x 33 Slide Valve Engine.  |
| 26 x 48 Corliss Engine.  | 13 x 24 Slide Valve Engine.  |
| 23 x 36 Corliss Engine.  | 11 x 24 Slide Valve Engine.  |
| 14 x 42 Corliss Engine.  | 10 x 20 Slide Valve Engine.  |
| 30 x 72 Corliss Engine.  | 16 x 48 Slide Valve Engine.  |
| 20 x 48 Wright Engine.   | 8 x 8 Slide Valve Engine.    |
| 11 x 20 Buckeye Engine.  | 14 x 30 Porter-Allen Engine. |
| 11 x 16 Porter-Allen Engine.   |                              |
| 60 H.-P. Westinghouse Standard Engine, almost new.                       |                              |
| 25 H.-P. Westinghouse Junior Engine, in good order.                      |                              |
| 8 x 25 Brennan Crusher, good as new.                                     |                              |
| 80, 80 and 60 H.-P. Horizontal Boilers, insured 80 lbs.                  |                              |
| 30 H.-P. Marine Locomotive Boiler, economical.                           |                              |
| Woodward Steam Fire Pump, 1000 gallons capacity.                         |                              |
| Worthington Duplex Pump, 10 x 6 x 10.                                    |                              |
| Niagara Pressure Pump, 12 x 6 x 12.                                      |                              |
| Blake Pressure Pump, 10 x 6 x 12.  |                              |
| Guild & Garrison Pump No. 2. Deep Well Pump.                             |                              |
| Cameron Low Service Pump, 350 gallons.                                   |                              |
| Three Ingersoll Rock Drills. One 8-ft. and one 9-ft. Blower.             |                              |
| Corliss Jet Condenser, 600 H.-P. Two Buckley Condensers, 500 H.-P. each. |                              |
| Two Blake Duplex Pumps, 6 x 4 x 7.                                       |                              |
| One Blake Pump.  |                              |
| Emery Grinder. Boring Bar. Two Platform Scales.                          |                              |
| Boiler Iron Tanks, 800 and 200 gallons capacity.                         |                              |
| Automatic Sawdust Feeder. 100 ft. of 7-in. Pipe.                         |                              |

**GEORGE M. CLAPP,**

74 Cortlandt St., New York.

I offer 3 20 in. x 24 in. Improved Straight-line Ingersoll-Sergeant Air Compressors,

built in 1890, and used only seven months at St. Clair Tunnel. Ready for delivery and in first-class condition.

1 24 in. x 60 in. Left-hand Harris-Corliss Engine. May be seen running.

**F. W. IREDELL,**

10 Park Place, New York.

### FOR SALE.

Corliss Vertical Engine, cylinder 32 x 60, latest pattern, high speed; suitable for rolling mill or electric light work. Address  
NATHAN BENHAM, Hartford, Conn.

## Great Bargains.

**Must be Sold and Removed.**

16 in. x 30 in. Horizontal Engine.

18 in. x 36 in. Horizontal Engine.

24 in. x 36 in. Horizontal Engine.

19 1/2 in. x 48 in. Beam Engine, with

Knowles Condenser.

Write us for what you want.

**LOVEGROVE & CO.,**

Third and Quarry Sts., Philadelphia, Pa.

## SECOND-HAND MACHINERY.

One Putnam Planer, 26 in. x 26 in. x 8. Fine order.

One Car Axle Cutting off and Centering Machine.

One Pond Machine Tool Co. Iron Planer, 40 in. x 40 in. x 24 ft., with two heads. In fine order.

One Large Lathe, swings 78 inches over ways, and takes 9 feet between centers. Fine order.

One Ferris & Miles 500-lb. Steam Hammer. One Belden 100-lb. Upright Power Hammer.

One each 60 lb. and 80 lb. Bradley Helve Hammers.

Send for circular of Second-hand Machinery in stock.

**HILL, CLARKE & CO.,**

156 Oliver St., Boston, Mass.

12 and 14 South Canal St., Chicago, Ill.

## LATHES IN STOCK:

16 x 8,  
18 x 8,  
21 x 10.

Hendey Make. Get price.

**THE SCRANTON SUPPLY AND MACHINERY CO.,**

Scranton, Pa.

### SOME BARGAINS HERE.

- 1 32 x 32 x 9 New Haven Planer
- 1 Hendey Shaper, 15 in. stroke, imp. vise; new.
- 1 30 x 30 x 5 New Haven Planer
- 1 14 x 6 screw Cutting Engine Lathe: new.
- 1 26-in. Diamond Auto. Knife Grinder, used 1 month.
- 1 24-in. " " Face
- 1 No. 1 " Universal Face and Angle Grinder, used 1 month.
- 1 3-Spindle Garvin Drill Press used 1 month.
- 1 16-in. Crank Shaper.
- And other machinery, new and second hand. Write for prices

**Machinists' Supply Company,**  
39, 41 and 43 Central Ave., Rochester, N. Y.

## FOR SALE.

**Centre and Side Bearing Steel Street Rails,**

All fit to relay and in lots to suit. Apply to

**F. E. PERKINS & BRO.,**

59-78 West St., Brooklyn N. Y.

## Desirable Second-hand MACHINERY.

### PLANERS.

- 1 40 in. x 36 in. x 10 ft. New Haven. A1 condition.
- 1 37 in. x 40 in. x 9 ft. Enterprise Machine Co. Good order.
- 1 28 in. x 28 in. x 7 ft. New Haven. Good order.
- 1 24 in. x 24 in. x 6 ft. Pease. Good order.
- 1 15 in. x 16 in. x 8 ft. Wilkinson. Good order.
- 1 18-in. crank Lathe & Morse. A1 condition.

### LATHES.

- 1 24 in. x 12 ft. Cady Engine Lathe. Good order.
- 1 24 in. raised to 28 in., x 8 ft. Cady Engine Lathe. Good order.
- 2 14 in. x 6 ft. Hendey, Rise and Fall Rest. Good as new.
- 1 17 in. x 6 ft. Fitchburg Compound Rest. A1 condition.
- 1 14 in. x 6 ft. New Haven, Rise and Fall Rest, and Chuck. Good order.
- 2 28 in. x 25 ft. Pond Lathes, Compound Rest. Good order (not screw cutting).

### MISCELLANEOUS.

- 1 No. 3 Pratt & Whitney Planer Screw Machine. Good as new.
- 1 No. 2 Brown & Sharpe Surface Grinder. A1 condition.
- 1 No. 3 Windsor Turret Lathe, Wire Feed and Automatic Chuck. Good as new.
- 1 Garvin Single-Spindle Profiler. Good as new.
- 1 24 in. Hendey Friction Shaper. A1 condition.
- 2 22-in. Gould & Eberhardt Gear Cutters. Good as new.
- 1 Merritt Heavy Back Geared Milling Machine. A1 condition.
- 1 No. 4 Spindle Garvin Drill Press. Good as new.
- 1 15 in. x 5 ft. Lodge & Davis Plain Turret Lathe. A1 condition.

Write for list of 500 New and Second-hand Tools in stock.

**THE GARVIN MACHINE CO.,**  
Canal and Lighthouse Sts., New York, N. Y.

## STEAM PUMPS.

- 1 14 in. x 9 in. x 18 in. Cameron; brass lined.
- 1 14 in. x 8 in. x 10 in. Worthington Duplex.
- 2 10 in. x 5 in. x 12 in. Niagara; solid brass.
- 1 12 in. x 10 in. x 12 in. Guild & Garrison.
- 1 10 in. x 6 in. x 12 in. Epping & Carpenter.
- 1 12 in. x 7 in. x 14 in. Epping & Carpenter.
- 1 16 in. x 9 in. x 18 in. Niagara.
- 1 8 in. x 5 in. x 10 in. Delamater Duplex; new.
- 1 14 in. x 12 in. x 18 in. Blake.

Send for new catalogue.

**THOS. P. CONARD,**

206 Walnut Place, Philadelphia.

**MARVIN BRIGGS, 61-63 Rutgers Slip, N. Y.**  
**SECOND-HAND MACHINERY.**

- |  |                           |
|--|---------------------------|
| <b>CORLISS ENGINES.</b>                                  | <b>AUTOMATIC CUT-OFF.</b> |
| 30 x 60 Harris-Corliss                                   | 24 x 36 Babcock & Wilcox. |
| 28 x 48 G. H. Corliss.                                   | 14 x 18 Halsey.           |
| 20 x 60 Harris-Corliss. (2)                              | 13 x 12 Pncenix.          |
| 18 x 48 G. H. Corliss.                                   | 12 x 12 Ball.             |
| 16 x 48 G. H. Corliss.                                   | 5 x 7 Payne.              |
| 14 x 30 Wetherill-Corliss.                               | 150 H.-P. Westinghouse.   |
| 12 x 30 G. H. Corliss.                                   | 25 H.-P. Westinghouse.    |
| 12 x 30 G. H. Corliss.                                   | PLAIN                     |
| 12 x 24 Wetherill-Corliss.                               | SLIDE VALVE               |
| 10 x 24 G. H. Corliss.                                   | ENGINES.                  |
| 20 & 40 x 60 Cross Compound Corliss.                     |                           |
| 14 & 22 & 36 x 24 Triple Expansion Propeller Engine.     |                           |
| 17 & 36 x 20 Steeple Compound Propeller Engine.          |                           |
| 16 x 18 High Pressure Link Motion Propeller Engine.      |                           |
| 8 & 16 x 16 Fore and Aft Compound Propeller Engine.      |                           |
| 4 & 7 x 5 Fore and Aft Compound Propeller Engine.        |                           |
| 2 & 3 1/2 x 3 1/2 Fore and Aft Compound Propeller Engine |                           |

Boilers, Pumps, Dynamos and

GENERAL MACHINERY.

**MARVIN BRIGGS, 61-63 Rutgers Slip, N. Y.**

## SECOND-HAND MACHINERY.

**Boring Mill,** 10 ft. 4 in. swing, 56 in. under cross rail, table 7 ft. 6 in. in diameter.

**Boring Mill,** 8 ft. 4 in. swing, 48 in. under cross rail, table 6 ft. 6 in. in diameter, two heads on cross rail.

Two 7-ft. **Engine Lathes.** 7 ft. between centers, face plates 6 ft. 3 in. in diameter.

76-in. **Planer,** 13 ft. long; heavy and powerful.

48-in. **Car Wheel Borer.**

**Axle Lathe.**

Write for photographs and further particulars.

**Eastern Branch,**

**NILES TOOL WORKS CO.,**

138 Liberty St., New York



**BAKER BLOWERS**, Nos. 1, 3, 4, 4½, 5, 6 and 7.  
**ROOT BLOWERS**, Nos. 1, 2, 3, 4, 5, 6 and 7.  
**Sturtevant Blowers**, Nos. 5, 7 and 8.  
 2 12 and 1 15 H.-P. Horizontal Boilers; new, very  
 cheap. 10 in. x 7 in. Blake Crusher; equal new. Cor-  
 liss' Patent 12 in. x 12 in. Roller Press; equal new. In  
 in. hole. 1 large Boomer & Boschert Press, 1 Niagara  
 Fly Wheel Pump, 14 in. x 7 in. x 10 in., brass lined.  
 Purchasers of machinery and those who have it for  
 sale, do well to correspond with C. R. BIGELOW,  
 Machinery Expert and Appraiser, 45 Dry St., New  
 York City.

**We cut them up for Scrap Iron.  
Will buy old Boiler Plate in rings  
and sheets 1-4 in. thick and  
upwards.**

**C. W. SCHULTZ & CO.,**  
No. 308 Walnut St., Philadelphia.

- 1 30 in. x 80 in. x 8 ft. Pease Planer. New.  
1 Putnam Car Axle Lath. New.  
1 Cold Sawing Machine for iron and steel. New.  
1 Jones & Lamson No. 3 Plain Screw Machine. Second hand.  
1 Parham Plain Screw Machine. Second hand.  
1 Jones & Lamson x3-in. swing Turret Chucking Lath.  
1 Brown & Sharpe No. 2 Screw Machine, wire feed.  
The above Tools can be had at very low prices.

**DANIEL KELLY,**  
51 N. 7th St., Philadelphia.

Corliss Engine, 14 x 36; first-class condition.  
Plain Engine, 12 x 30; good order.  
Belt Wheel, 8 ft. diam., 10 in. face, 7 in. bore.  
Belt Wheel, 10 ft. diam., 13 in. face, 6½ in. bore; split  
Belt Wheel, 11 ft. diam., 18 in. face, 13 in. bore; split.  
2 Sturtevant Fans, 8 ft. high.  
Clutch Pulley, 60 in. diam., 23 in. face, 5 7-16.  
Large assortment New and Second-hand Machinery  
Shafting, Pulleys, Belting, Tools, Iron, &c.

**H. B. BIRTWELL,**  
343 North 3d St., Philadelphia.

A full set of Automatic Cut-off Engine Patterns, with drawings, wood cuts and patent right to manufacture; are almost new, and were made by the finest workmen. If sold at once will let them go at a sacrifice. Address "ENGINE," No. 112, office of *The Iron Age*, 96-102 Reade street, New York.

5 Centrifugal Pumps.  
2 3 H.-P. Engines. New.  
3 5 H.-P. Engines. New.  
8 20 H.-P. Engines, also up to 80 H.-P. New.  
10 5 and 10 H.-P. Gas Engines. New.  
12 Drill Presses, new, different sizes.  
800 Truck Wheels, new, 1½ cts., New York.  
All guaranteed fully.  
H. H. MANSFIELD, 126 Liberty St., New York

**Four second-hand 75 H.-P. Double-Deck Boilers,**  
with all fittings and fixtures. In first-class  
condition. Cheap.  
**Two 2-flue Boilers,** 48 in. diam. x 32 ft. long, in  
prime condition. Cheap.  
**One 16 x 22 Side Crank Engine.**  
**One 16 x 36 Side Crank Engine.**  
Full line of new and second-hand Boilers and  
Engines always on hand.  
**H. M. Sciple & Co., 3d and Arch Sts., Philadelphia, Pa.**

One 16 x 24 in. Standard Gauge Locomotive.  
One 15 x 20 in. Standard Gauge Locomotive.  
One 7 x 12 in., 36-in. Gauge Locomotive.  
Fire Box Boilers from 1 to 15 horse-power in  
stock; Engines, Boilers, Shears.  
Hoisting Engines, Derricks and Contractors'  
Machinery.

**THOMAS CARLIN'S SONS,**  
Allegheny, Pa.

**Second-hand Machinery, Pulleys, Shafting and Belting.  
Two Slide Valve Steam Engines,  
20-inch cylinders, 48-inch stroke.**

These engines are geared at right angles and placed upon extra heavy iron trasses with wrought-iron shafts of which there is a 9-foot spur wheel geared to a 3-foot pinion wheel of corresponding strength. Also one battery of five steam boilers each 24 feet long, 42 inches in diameter, with two 10-inch flues in each, complete. 2000 feet shafting, assorted lengths, diameter for 1 1/4 to 4 inch s, 50 assorted iron pipes from 6 inches to 18 inches, 100 iron hangers to suit shafting, one lot of good leather belting from 4 to 18 inches in width. All the above in first-class condition and for sale at a low figure in large or small lots to suit the purchaser.

The Faber Machinery Supply Co., Pittsburgh, Pa.

**Large lot of Loco. Boilers,**  
50 to 100 H.-P., in first-class order.

Can furnish stacks, grates and all fittings to suit purchasers.

**CHESTER BERTOLETTE & CO.,**  
Norristown, Pa.

1 Cameron Pump, No. 12 Special.  
2 Guild & Garrison Pumps, No. 3.  
2 Small Pumps.  
1 8 in. x 12 in. Vertical Engine.  
1 Dimpfel's Blower, 5 ft. x 20 in.

**DAN'L W. RICHARDS & Co.,**  
86-92 Mangin St., New York

2 Double Deck Rollers about 40 H.-P. each, good and cheap. 2 Iron Tanks, 8 ft. in diameter, 30 ft. long, 8-10 in. thick, 1000 gals. capacity. Cylindrical Tanks for Stacks, 40 and 42 in. diameter. Other Tanks from 10 in. up to 20 and 30 ft. long. Hoisting Engine. Round and Square Iron Tanks, different sizes. Dealers in all kinds of Scrap Iron, New and Old Metals and Machinery.

**BUSSENIUS & CUNLIFFE,**  
12th and Washington Ave., Philadelphia.

**CRANK and  
GEARED SHAPERS.**  
Write us for Bargains.  
**J. STEPTOE & CO., Cincinnati, O.**

**FOR SALE.**  
Plate Mill suitable for nail works. For particulars, &c., address

Office of *The Iron Age*, 220 South 4th St.  
Philadelphia, Pa.

25 lb. section iron T Rails in good condition for relaying.

WM. H. PERRY & CO.,  
Providence, R. I.

Extra strong, with engine attached 17 x 24 in.  
Weight of Squeezer alone 96,000 lbs. In use  
two years. For further particulars address  
P. O. BOX 205,  
Pittsburgh, Pa.

8-in. stroke, with automatic cross, side and circular feeds and quick return, complete; modern style; first-class order. Will be sold low.

**J. J. McCABE,**  
68 Cortlandt St., New York.

A 100-pound Bradley Strap Hammer of latest type; has been used but a few weeks and is in perfect order.

MENEELY BEARING CO.,  
West Troy, N. Y.

**NEW AND SECOND-HAND, FOR SALE.**

80 in. swing, 18½ ft. bed, Triple Gearing, Screw Feed.  
60 in. " 45 ft. " " Double Lathe.  
52 in. " 35 ft. " " Rod Feed, with Hor. Boring  
Mch. one end of bed.  
50 in. swing, 30 ft. bed, For Rolling Mill Forgings. New  
30 in. " 28 ft. " Pond Mach. Tool Co. Shafting  
Lathe. A. I.  
32 in. swing, 16 ft. bed. New.  
32 in. " 20 ft. bet. centers, Engine Lathe. D. W.  
Pond.  
28 in. swing, 22 ft. bed, Engine Lathe. Cheap. 2  
24 in. " 20 ft. " " " " 2  
24 in. " 12, 16, 20 and 24 ft. bed, Engine Lathes. New.  
22 in. " 10 ft. bed, Engine Lathe, A. I.  
21 in. " 10 and 12 ft. beds, Engine Lathes. New.  
20 in. " 7½ and 8 ft. " " Good.  
18 in. " 8 and 8 ft. " " Several Makerr.  
16 in. " 6 and 8 ft. " " "  
15 in. " 6 and 8 ft. " " "  
14 in. " 6 ft. " " "  
15, 18 and 25 in. stroke Crank Shapers, Steptoe. New.  
22, 26 and 30 in. " Geared " "  
9 1/2 in. " " Crank " Good order.  
15 in. and 24 in. " " " " "  
20 in.-22-24-28-30-36 in. Drills. New and Second-hand.  
15 in. x 3 ft. and 20 in. x 4 ft. Planers.  
22 in. x 5 ft. and 24 in. x 6 ft.  
22 in. x 5 ft. and 26 in. x 7 ft.  
30 x 80 x 8 ft. Planer. D. F. Pond.  
42 x 42 x 16 ft. " B & D  
52 x 42 x 24 ft. " 2 heads, Betts.  
64 x 61 x 10 ft. " Bement.  
11 x 18 Horizontal Slide Valve Engine.  
40 1/2 in. P. Vertical Engine. A. I.  
100 in. and 300 in. Bement Steam Hammers  
Car Axle Lathe, Bement.  
1¼ and 1½ Bolt Cutters.  
8 and 13 in. stroke Slotting Machines.  
No. 75 Bilas Geared Punch Press.  
Lincoln Pattern Millers, Gang Drills, Screw Machine,  
Cut, Scott Gear Rolling Machine, O'Brien's Pat.  
Planing Machine for Boiler Heads.

120 Broadway, N. Y.

## Relaying Rails and Narrow Gauge Equipment For Sale Cheap.

- 100 tons I Beams from 7 to 15 in. and 15 to 28 ft. long.  
200 tons 35 pound Iron Tee Rails. " "  
300 " 30 " " " " " "  
300 " 48 " " " " " "  
25 " 16 " " " " " "  
500 " 52 " Johnson Girder Steel Rails,  
with Chairs.
- 1000 tons Flat Rails, all weights.  
200 Narrow Gauge Flat, Coal, Box and Stock Cars; 4 Coach, Mail, Baggage, Berthing and 20 Hand and Push Cars, 13 Standard Gauge Locomotives.
- I am in the market at all times to buy or sell anything in the way of second-hand Equipment Rails, also Scrap. In answering, kindly mention this paper.

**L. K. HIRSCH,**  
549 Rookery, Chicago, Ill.

Rolling Mill and Nail Factory of the Lewisburg Iron and Steel Co. Mill supplied with water, slate roof buildings, 2 engines, 4 large tubular boilers, 7 puddling furnaces, 1 large heating furnace with boiler over same, 42 nail machines, 2 trains of rolls, and other machinery. Connection with Pennsylvania R.R. and Philadelphia & Reading R.R. by switches on both sides of mill. Works now in operation. Address ALFRED HAYES, Secretary, Lewisburg, Union Co., Pa.

With capacity to take [pulleys 36 in. x 12 in.  
Good order. Will be sold low.

**J. J. McCABE,**  
68 Cortlandt St., New York.

# IRON WORKS IN CHICAGO.

**About one mile from Court House.**

**Foundry, Machine Shop, Pat-  
tern Shop, Blacksmith's  
Shop, &c.**

Address "C. R. C.,"  
Office of *The Iron Age*, 59 Dearborn St., Chicago

$\frac{5}{8} \times 7-10$	$1\frac{1}{2} \times \frac{5}{8}$
$\frac{3}{4} \times \frac{1}{4}$	$1\frac{3}{4} \times 1\frac{1}{2}$
$1\frac{1}{8} \times 7-10$	$1\frac{3}{4} \times \frac{5}{8}$
$1\frac{1}{8} \times \frac{1}{2}$	$2 \times \frac{5}{8}$
$1\frac{1}{8} \times 5-10$	$2\frac{1}{2} \times \frac{1}{4}$

If interested in these sizes write to  
**CHARLES C. LEWIS,**  
 Iron and Steel Merchant,  
 Springfield, Mass.

## FOR SALE.

Complete Bessemer Plant, second-hand, by Galloways, Manchester. Only done 18 months' work. Consisting of one pair of High Pressure Vertical Blowing Engines, Cylinders 30 inch steam, 42 inch air, 4 feet stroke. Hydraulic Pumps, Accumulator, two eight-ton Converters, One Hydraulic Centre Pit Crane complete and two five-ton Ingot Cranes, Distributing Boxes, Cupolas, Cupola Staging, Lift and Casting Ladles complete.

Drawings and fuller particulars on application to

THOMAS W. WARD,  
Fitzalan Chambers, Sheffield, England.

### FOR SALE

The Vulcan Iron Works, located at Oswego, New York, has a large and prosperous business in the manufacture of dredges steam shovels, marine pumps, &c., &c.; also have a large jobbing business. This is an old and thoroughly established concern, and will be a very profitable investment for the right man. Terms of suit purchaser. The only reason for selling is that the owner is advancing in years, and his health being poor, desires to retire from active business. Address B. F. CHASE, Chicago, Ill., or R. H. KING, Oswego, N. Y.

## Receiver's Sale.

In the matter of the voluntary dissolution of "The Albany Stove Company," the undersigned, as Receiver, will sell at public auction at the City Hall, in the city of Albany, N. Y., on the 20th day of March, 1898, at 12 o'clock noon of that day, the real estate, buildings, consisting of foundry, engine room, mounting shop, warerooms, sheds, and racks, tables, benches, tanks, machinery, tools, implements, patterns, shop rights and flasks of the said "The Albany Stove Company," all of which property is situated in the city of Albany, N. Y.

JOHN GUTMANN, Receiver.

An old established

## Iron Manufacturing Firm

of Pittsburgh, who have space and power to spare, would like to add to their business the manufacture of electric supplies or specialties for railroad or other use, that would consume part of their product, or that could be made an adjunct of the iron business. Those having anything in the above line, in actual use or in prospectus, who desire such connection can address

"IRON WORKS,"

office of *The Iron Age*, 509-510 Hamilton Building, Pittsburgh, Pa., with information covering merits of articles to be manufactured, and same will be carefully considered and appointment made if found suitable.

## WANTED.

Responsible parties to manufacture and sell on royalty, a cheap portable steel or iron *CULVERT BRIDGE*; it is adapted to all small streams, runs, etc., in roads, streets, *RAILROADS*, etc.; improved roads is the order of the day; use this bridge, put it below the level of the road, cover it over and thus prevent jarring and wear and tear of vehicles, etc. Apply to

W. A. NICHOLS,  
Girard Building, Philadelphia, Pa.

## FOR SALE.—Manufacturing Interest.

Parties desiring to change their business relations will sell their stock in a well established, prosperous and growing corporation located in Chicago, manufacturing specialties and a staple line of steam and plumbing goods. The stock earns large dividends annually and is an excellent investment. Full particulars upon application. Address "STOCK," office of *The Iron Age*, 59 Dearborn St., Chicago.

## FOR SALE AT ROCKAWAY, N. J.

A valuable Mill property in first-class condition, on the line of the D., L. & W. and N. J. Central Railroads, containing 14 acres of land, water and steam power, two turbine wheels, one large mill suitable for axe or machinery works, three new two-story blacksmith, machine and pattern shops, three dwellings, dynamo and other buildings. The water is pure and suitable for silk or paper factories or dye works. Apply to W. A. TORREY, 6 Wall St., New York.

**WANTED.**—A moderate capital to be used in the purchase and operation of an Architectural Iron Business, with a modern and complete plant conveniently located for both foreign and domestic markets. Apply by letter addressed to "Z," No. 39, office of *The Iron Age*, 96-102 Reade St., N. Y.

## WHERE TO LOCATE NEW FACTORIES.

The Illinois Central Railroad Company is desirous of calling the attention of capitalists and manufacturers to the advantages possessed by the different cities and towns on their Southern Lines and on the lines of the Yazoo & Mississippi Valley Railroad Company in the shape of

## UNLIMITED RAW MATERIAL, PROXIMITY TO MARKETS, CHEAP LABOR,

Fuel, etc., and believes that it needs but a presentation of their merits to attract the careful attention of all interested in converting the raw materials to be found on their lines into the finished product. Prominent among these are cotton, hard and soft wood, clay, fruits, vegetables, etc. A descriptive pamphlet of 150 pages, entitled "Where to Locate New Factories," has been issued by the Company, and a copy will be sent free on application to the undersigned, who will also give any further information as to

## Inducements Offered

by the different localities for desired industries. Individuals or companies wishing to embark capital in cotton, clay, wood-working, canning or other industries, can find a profitable field and hearty co-operation. For particulars address GEO. C. POWER, Industrial Commissioner I. C. R. R., 58 Michigan Ave., Chicago.

## Manufacturing Plant For Sale.

A bargain, located at Davenport, Scott Co., Iowa, adjoining the Chicago, Rock Island & Pacific Railway.

Ground space, 150 x 160 ft. Buildings, brick and frame. Nine thousand (9000) feet floor space for manufacturing, and five thousand (5000) ft. of storage and warehouse space, and in addition are sheds, barns, two (2) dry kilns and a large ten (10) room dwelling.

Factory already fitted up, and in shape to run. Two (2) boilers; one (1) 50 H.-P. engine; four hundred (400) ft. of shafting; one hundred and twenty (120) pulleys, with hangers, belting and a complete system of steam heating &c., &c. Was purchased very low and will be sold at a small advance.

Send for sketch and full description to  
C. N. NEWCOMB,  
4th and Warren streets, Davenport, Iowa.

## FOR SALE OR RENT.

Manufacturing Property.

Having purchased the Auburn Manufacturing Company's plant, with greater facilities for manufacturing carriage forgings, which my increasing trade demands, I offer my former plant for sale or rent, which consists of two-story stone and wood building, 60 x 30, and three-story stone and brick building, 75 x 40. Also forge shop, 22-ft. posts, 150 x 54, with large double windows between each bent. 50 x 30 boiler house. Splendid water power, 11 ft. head.

One 64-in. American Turbine.  
One 24 in. Little Giant Turbine.  
200 ft. 2 3/4 Cold Rolled Iron Shafting.  
40 ft. 2 3/4 Cold Rolled Iron Shafting.  
60 ft. 2-in. Cold Rolled Iron Shafting.  
Furnished with self-oiling boxes. Water wheel governor; 4-ton Buffalo Scales. The premises cover about 2 1/2 acres. Shipping facilities of the best. Located near N. Y. Central and Philadelphia and Reading depots. Will be sold cheap and on easy terms or rented. For particulars address

RICHARD ECCLES, Auburn, N. Y.

## Screw Machine. (Large Size.)

Jones & Lamson's No. 11, with 2 1/2-in. hole, clutch gears, chasing bar, with full assortment of hobs. Turret 13 in., with auto. feed, and complete with chucks and tools; first-class order. Will be sold low.

J. J. McCABE,  
68 Cortlandt St., New York.

## FOR SALE.

A nice, clean stock of Builders' Hardware and Carpenters' Tools. Best location and trade in the city. Address

W. J. FLYNN HARDWARE CO.,  
St. Joseph, Mo.

## FOR SALE.

# FOUNDRY!

Or can be used for any kind of

Manufacturing Purposes.

East Chicago, Ind., on the Belt R. R. (with several trunk lines); track on the premises main building, 90 x 180 feet; annex, 28 x 90; engine room, 24 x 26; melting room, 22 x 43; machine shop, 50 x 50 feet; 6 swinging cranes; elevated track for handling heavy machinery; Sturtevant blasting fans; 2-story office, 14 x 16 feet. Buildings new and thoroughly constructed of iron and brick. Ten acres of land, with railroad tracks on land and new canal across one end, giving water connection to Lake Michigan and Calumet River.

East Chicago has sewers, water, gas, electric light, new opera house and is growing fast.

Will sell with part of land or all, or remove such machinery as purchaser does not want. Price, as it stands, \$60,000. Terms satisfactory.

V. H. SURGNOR,

85 Dearborn St., Room 310,

CHICAGO, ILLINOIS.

## FOR SALE.

24 20-in. Muck Rolls.  
One two-high 20-in. Muck Train.  
One double three-high 20-inch Muck Train.  
One large Rotary Squeezer, with spare pieces.  
68 Puddling Furnaces.

All in AI condition. Address

"ROLLING MILL,"

office of *The Iron Age*, Rooms 503-510 Hamilton Building, Pittsburgh, Pa.

## WANTED.

One Corliss Engine, from 100 H.-P. to 200 H.-P.

Send full particulars to  
JAMES R. G. WILLIAM,  
115 No. 6th St., Philadelphia.

## TACK MACHINES WANTED.

A Tack concern wishes to purchase or have built 20 to 50 Tack Machines. Address, stating style of machine, prices, terms, and how long it will take to deliver them.

KNIFFLER MFG. CO.,  
30 Euclid Ave., Cleveland, O.

## WANTED.

Foundry Contracts to be completed before September 1st. Capacity of works, 9 tons per day. Can make close prices and prompt shipment.

FRANK C. PATTEN CO.,  
Sycamore, Ill.

## Collections?

All merchants and manufacturers have past due claims which need attention. We make such business a specialty. Our terms and method are right. Write us and see.

THE HARDWARE BOARD OF TRADE, Ltd.,  
4 and 6 Warren street, New York.  
JAS. H. GOLDBY, Treas.

## WANTED TO BUY.

Scrap Soft Sheet Steel. Cut in strips 3 to 6 in. wide, No. 18 and 20 gauge.  
PULLMAN SASH BALANCE CO.,  
Rochester, N. Y.

**FOR SALE.**

Our stock of Hardware. The foundation for a large and profitable jobbing business is already laid. Our store building is especially adapted to doing a large business. Situated in a terminal city in the State of Washington. Only those who can command large capital need answer. Address

"J. C." Box 316,  
office of *The Iron Age*, 96-102 Reade St., N. Y.

**FOR SALE.**

An old established prosperous business in a large city of New York State, fitted complete for and engaged in the manufacture of hardware specialties. Or with right party or parties who thoroughly understand this business will form an incorporated company, leaving in all of the present plant as stock. Present proprietor sells because other matters more important to him are imperatively demanding all of his time. Address "PROSPEROUS BUSINESS," office of *The Iron Age*, 96-102 Reade St., N. Y.

**WANTED,**

At Colorado City, Texas, a Roller Mill to be put up at once. Big inducements offered. Address H. H. BEYER, Colorado, Texas.

**Hardware Stock.**

For sale in the city of Rochester, stock of general Hardware, House-furnishing Goods, Paints, Oil, Glass, &c. First-class location; doing a good business; amount of stock about \$6000; will bear a close investigation. Address

"HARDWARE," Box 114,  
Rochester, N. Y.

**FOR SALE.**

Well established Hardware business in the Northeastern part of Pennsylvania; cheap. Particulars on application. Address

"REMOVAL,"  
office of *The Iron Age*, 96-102 Reade St., N. Y.

**A RARE BARGAIN.**

**FOR SALE.**—An established Hardware, Furnace, Range, Stove and Sheet Metal Business of 24 years' standing at Carthage, Missouri (county seat of Jasper County). Stock, fixtures and tools, well assorted and in first-class condition. New brick store building, with full plate-glass front, latest improved adjustable full height shelving, roller ladders, elevator, &c. Building covers 50 x 122 feet, consisting of basement, first and second floors (all dry and nicely lighted). Will rent or sell building. Largest stock, leading trade (almost exclusive cash), and best location (corner public square) in the city. All goods, &c., at cost and carriage; no bonus required for good will of trade. **Terms spot cash.** Reason for selling, wish to retire from business. Only those who mean business need apply. Please call on or address.

McCRILLIS BROS.,  
Carthage, Missouri.

**FOR SALE.**

A stock of Builders' Hardware, Farming Implements, Stoves, Ranges and Furnaces, together with a well-equipped Tinsmith. Also paints, oils and varnishes, store fixtures, two horses, wagons, sleighs and harnesses. Business located four miles from Boston, in the city of Malden, of about 30,000 inhabitants. A rare chance for the right man. Reason for selling, present owner engaged in other business in New Jersey. Address or apply to

C. D. ADAMS,  
No. 23 Court St., Boston.

Office hours, 12 to 1 p.m.

**NOTICE.**

A thoroughly posted hardware man to take from \$5000 to \$20,000 stock in a company which now has \$75,000 paid up; has been established 14 years; business prosperous. Located at a capital Southern city. Prefer a man of 35 to 40 years. Must take an active interest. Splendid opening to right man. All references required. Address "SOUTHERN CITY," office of *The Iron Age*, 96-102 Reade St., N. Y.

**Hardware Stock For Sale.**

A \$4000 stock in a fine manufacturing town with a population of about 5000. Annual sales \$35,000. Tin shop in connection, with large factory trade and telephone connections with all factories and Chicago. This is one opportunity in a lifetime. **Terms cash.** If you want a bargain address "M.," office of *The Iron Age*, 59 Dearborn St., Chicago, Ill.

**The Best Opening in the United States**

For an exclusive wholesale Hardware house can be found in the city of Tacoma, Washington. For particulars call on or address

E. L. SHAFNER, Sec'y Commercial Club,  
Tacoma, Wash.

**GOOD STOVE MAN WANTED.**

A first-class man with capital to open a Stove, Mantel and Tinware store in Tiffin, Ohio (12,000 population). Three-story building in the very heart of business, and has been the leading stove room for 25 years; has elevator and all conveniences. The right man can step into a good trade at once. Present tenant goes out April 1st. Rent reasonable. Address

JOHN C. LOOMIS,  
Tiffin, Ohio

**Agencies Wanted.**

Having a large and centrally located store, convenient to the hardware trade of New York City, would like to secure agencies for heavy hardware, pipe, iron, &c., on salary or commission. Address

CHAS. J. STEBBINS,  
103 Reade St., New York.

**IF FROM ANY CAUSE**

You have goods to offer at specially low figures for **SPOT CASH**, that you wish disposed of without danger of interference with your regular trade, address

W. M. CALDWELL,  
Agent for the sale of **Special Lots**,  
75 Chambers St., New York.

**FOR SALE.**

Hardware business in a city of 40,000. Best location. Stock will invoice about \$10,000. Annual sales, \$30,000, which can be increased readily. Present owner is engaged in other business and can give this no personal attention. Favorable terms. Address

J. C. PETERS,  
Fort Wayne, Ind.

**CHARLES WEILAND.**

I make a special business of buying and selling Job Lots of

**HARDWARE AND CUTLERY**

Tools and Second Quality Files a Specialty.  
Send for Catalogue,

143 Chambers St., New York

**STEAM PUMPS.**

All inquiries for second hand pumps, of which we always have several on hand, of our own and other makes, will have prompt attention. For catalogues of the Hooker Patent Steam Pumps and full information in regard to steam pumps address

HOOKER-COLVILLE STEAM PUMP CO.,

30 W. Randolph St., 2d and Carr Sts.  
CHICAGO. ST. LOUIS.

**BLOWING ENGINE FOR SALE**

Vertical pattern, with balanced steam slide valve gear, steam cylinder 14 in. diameter, air cylinder 40 in. diameter, stroke 24 in. 1 to 100 strokes per minute; engine new.

JAMES LEFFEL & CO., Springfield, Ohio.

**EUGENE BISSELL, Auctioneer. HAYDOCK & BISSELL**

Successors to  
ROBERT R. HAYDOCK & Co., and E. BISSELL & Co  
WHOLESALE

**HARDWARE AUCTIONEERS,**  
13 Murray St. and 15 Park Place, N. Y.  
Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

**THE LATEST BOOKS.**

**The Geometrical Draughtsman.** Edited by the editor of "The Industrial Self-Instructor." Being a series of practical diagrams and designs applicable to the work of the architect and builder, the engineer and machinist, the artisan and general draughtsman, in designing the various structures useful in the industrial arts; with a practical paper introductory to the work of industrial drawing and designing by various authors and draughtsmen. 150 pp., cloth.....\$2.00

**The Water Meter; Its Difficulties, Types, and Applications.** Manual of reference and fact in connection with the supply of water by meter. By WALTER G. KENT. 122 pp, folding plates, cloth \$1.50

**Treatise on Modern Sanitary Appliances for Healthy Residences and Public Institutions for the use of students.** By F. COLYER. 8vo, cloth \$2.00

**Standard Tables for Electric Wiremen,** with instructions for Wiremen and Linemen. Rules for Safe Wiring, Diagrams of Circuits and Useful Formulae and Data. By CHARLES M. DAVIS. Third edition, thoroughly revised and edited by W. D. Weaver. Illustrated, 18mo, mor.....\$1.00

**The Hardwood Finisher.** By F. T. HOBSON. With Rules and Directions for finishing in Natural Colors and in Antique, Mahogany, Cherry, Birch, Walnut, Oak, Ash, Redwood, Sycamore, Pine and all other Domestic Woods. Finishing, Filing, Staining, Varnishing and Polishing. 12mo, cloth \$1.00

**Drawing and Engraving; a Brief Exposition of Technical Principles and Practice.** By F. G. HARTON. Illustrated, 8vo, cloth.....\$7.50

**Text-Book of Petrology;** Containing a description of the Rock-Forming Minerals, and a Synopsis of the Chief Types of Igneous Rocks. By F. H. HATCH. 86 illustrations, 12mo, cloth.....\$0.90

**Notes on the Construction of Cranes and Lifting Machinery.** By EDWARD C. R. MARKS. 118 illustrations. 12mo, cloth.....\$1.00

**Mechanics.**—The Technical Student's Introduction to. Being a series of Practical Papers showing the leading Principles of Physical Science, exemplified in the Properties of Bodies or Materials; the laws which Regulate the Phenomena of Motion of Heat, of the atmosphere, of Water at Rest and in Motion, etc., etc. as applied to the Practical Work of the Architect and Builder, the Engineer and Machinist, and the General Artisan engaged in the Designing and Construction of Machines, Tools, and Appliances Useful in the Industrial Arts. By Various Writers. Edited by Robert Scott Burn. About 150 Illustrations, 12mo, cloth.....\$2.00

**Practical Sanitation.** By Dr. GEO. REID. A Handbook for Sanitary Inspectors and others interested in Sanitation. With an Appendix on Sanitary Law, by Herbert Manley. Illustrated, 8vo, cloth \$3.00

**The Assayer's Guide;** or, Practical Directions to Assayers, Miners and Smelters for the Tests and Assays by Heat and by Wet Processes of the Ores of all the Principal Metals; of Gold and Silver Coins and Alloys; and of Coal, &c. By OSCAR M. LIEBER, Late Geologist to the State of Mississippi. A new, revised and enlarged edition. Fully illustrated. In one volume, 12mo, 283 pages.....\$1.50

**Treatise on the Modern Sanitary Appliances for Healthy Residences and Public Buildings,** for the use of students. By F. COLYER. 8vo, 113 pages, cloth.....\$2.00

**Electric Lighting for Marine Engineers;** or, How to Light a Ship by the Electric Light and How to Keep the Apparatus in Order. By SYDNEY F. WALKER. 293 pages, illustrated, 8vo, cloth ..\$2.00

**The Practical Surveyor's Guide.** By ANDREW DUNCAN. Containing the necessary information to make any person of common capacity a finished land surveyor. New, revised, enlarged edition. 214 pages, 12mo, cloth.....\$1.50

**The Iron and Steel Institute in America in 1890.** Special Volume of Proceedings. Containing a full account of the Excursions and Proceedings, as well as a record of observations made by some of the English members on the mineral resources and manufacturing metallurgical capabilities of the United States. Maps, Plates and Illustrations. 8vo, cloth.....\$10.00

**Spon's Tables and Memoranda for Engineers.** 11th edition (vest-pocket edition). 140 pages, flexible leather.....\$0.40

**Practical Electric Light Fitting.** By F. C. ALLSOP. A treatise on the wiring and fitting-up of buildings deriving current from central station mains and the laying down of private installations. 290 pages, 12mo, cloth.....\$1.50

**Coal Pits and Pitmen.** By R. NELSON BOYD. A short History of the Coal Trade and the Legislation Affecting It. Illustrated, 12mo, cloth.....\$1.50

**Triple and Quadruple Expansion Engines and Boilers and their Management.** By A. RITCHIE LEASK. 69 illustrations, 12mo, cloth.....\$2.00

**Electricity and Magnetism.** By Prof. E. J. Hous-ton. Being a series of Advanced Primers of Electricity. 115 illustrations. 12mo, cloth.....\$1.00

**Handy Tables from Thurston's Steam Engine Manual.** By Prof. R. H. THURSTON. For use in Laboratory Computations in Technical Schools. 8vo, cloth.....\$1.50

**Simple Lessons in Drawing for the Shop.** By ORVILLE H. REYNOLDS. Illustrated, 16mo, cloth.....\$1.00

**A Handbook of Electrical Testing.** By H. R. KEMPE. Fifth edition, revised and enlarged. 200 illustrations. 8vo, cloth.....\$7.25

Sent, postpaid, on receipt of price by

DAVID WILLIAMS Publisher and Bookseller,

96-102 Reade Street, New York.

**HELP WANTED.**

*Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.*

**A** COMPETENT, energetic Foreman or Superintendent to take charge of concern manufacturing a general line of brass and iron steam appliances; must be a pusher, competent to handle 150 men or more to best advantage, well up in modern shop practice and the methods employed for rapid work; state age, experience and salary expected. Address "ENERGETIC," Box 316, office of *The Iron Age*, 96-102 Reade street, New York.

**S**UPERINTENDENT wanted.—An American, to take charge of an old established machine shop and foundry; not under 35 years of age; must be a good draftsman and well up in modern machine shop methods, with a knowledge of hydraulic engineering and competent to design and construct special machinery and devices for the saving of labor. Address "SHOP METHODS," office of *The Iron Age*, 96-102 Reade street, New York.

**A** FIRST-CLASS Roll Turner, one accustomed to guide mill and bar mill work; references as to character and ability required. Address "GUIDE MILL," office of *The Iron Age*, 96-102 Reade street, New York.

**F**OREMAN to take charge of a brass foundry making all kinds of jobbing work; employ 12 molders; an experienced man with some capital to invest desired, as a guarantee of faithful services; a good position to the right man. Address "Good Position," office of *The Iron Age*, 96-102 Reade street, New York.

**F**OREMAN to take charge of shop manufacturing hand hammers of all kinds, sledges, &c.; must be well up in all branches of the work and able to superintend. Address "G. B.," No. 316, office of *The Iron Age*, 96-102 Reade street, New York.

**BY** WHOLESALE hardware house in Philadelphia, two experienced hardware Entry Clerks. Address, with references, "DIX," office of *The Iron Age*, 96-102 Reade St., N. Y.

**S**ALESMEN wanted to take the Jack Frost Freezer as a side line. JACK FROST FREEZER CO., 29 Murray street, New York.

**A** COMPETENT Business Manager to take charge of a large and well established foundry and machine shop in Chicago; must have experience and be well recommended. Address "BUSINESS MANAGER," office of *The Iron Age*, 59 Dearborn St., Chicago, Ill.

**A**N EXPERIENCED Traveling Agent who is familiar with explosives. Address "EXPLOSIVES," office of *The Iron Age*, 96-102 Reade St., New York.

**A**N ENAMELER; salary \$1500 per year; works located in a desirable section of the country; state what kinds of enameling you can do and experience you have had in the business; none but an expert need apply. Address "ANENAMEL," office of *The Iron Age*, 96-102 Reade St., New York.

**R**ESIDENT and traveling Salesmen, energetic and reliable men, to carry and push as a side line a patent first-class forged steel and useful mechanical tool. Address "K.," Letter Carrier 15, Buffalo, N. Y.

**S**ALESMEN wanted on commission.—Manufactory established 25 years, wants to increase its business by pushing article of easy sale to hardware trade. Address "MORGAN," office of *The Iron Age*, 96-102 Reade St., N. Y.

**SITUATIONS WANTED**

*Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.*

**D**ESIGNER and Draftsman, with experience in machine tools and hoisting machinery, wants position; has had shop experience and is graduate from one of the leading engineering colleges. Address "D. AND D.," office of *The Iron Age*, 96-102 Reade St., New York.

**P**OSITION as Rolling Mill Superintendent competent to design and erect rolling mills, also to design rolls for all kinds of structural shapes; prefer to erect new mill and then, if required, superintend the manufacture. Address "ROLLING MILL ENGINEER," 3343 North 17th St., Philadelphia, Pa.

**H**ARDWARE MAN, experienced in office and management of business and acquainted largely with the trade in territory between Atlantic Coast and Mississippi, wants inside position either with mercantile house or factory; has experience in office and sales department of factory; tip-top references. Address "ATLANTIC COAST," office of *The Iron Age*, 96-102 Reade St., New York.

**A**S TRAVELING SALESMAN; 17 years' experience in general hardware; good connections through Canada; has also traveled Middle and Southern States; All references. Address "EXPERIENCE," office of *The Iron Age*, 96-102 Reade St., New York.

**M**AN 24 years of age desires position after April 1st as Salesman in iron, steel and heavy hardware business or manufacturers' agent with some reputable manufacturer; Western territory; six years' experience; reference from present employer. Address "P. Q.," Box 316, office of *The Iron Age*, 96-102 Reade St., New York.

**BY** PRACTICAL MAN, position as Superintendent of manufactory making locks and builders' hardware; 25 years' experience as foreman and superintendent; understands brass and iron founding, pattern and die making thoroughly; can handle men and material economically; have been with some of the largest firms in the country; recommendations. Address "L. A. H.," Box 316, office of *The Iron Age*, 96-102 Reade St., New York.

**BY** A COMPETENT hardware Salesman, thoroughly posted in builders' hardware, tools, cutlery, stoves and all branches of the hardware business; speaks English and German; highest grade of credentials given as to character and business qualifications. Address "HIGH GRADE," office of *The Iron Age*, 96-102 Reade street, New York.

**A** GENTLEMAN with 25 years' experience in the iron, steel and metal jobbing and importing business in New York wants to represent a manufacturer or dealer in this city. Address "M. & D.," office of *The Iron Age*, 96-102 Reade street, New York.

**M**ECHANICAL Engineer and Draftsman.—Experienced designer of high speed and triple expansion engines for electric lighting and power plants is open for engagement. Address "Box 316," office of *The Iron Age*, 96-102 Reade street, New York.

**F**OREMAN in architectural iron works.—Situation wanted by a practical mechanic; energetic and reliable; 18 years' experience as foreman; familiar with cast and wrought plain and ornamental iron work, iron fronts, structural work, stairs, railings, elevator enclosures, doors, window guards, fire escapes, &c.; accustomed to plans and handling men; All references. Address "H. J.," Box 316, office of *The Iron Age*, 96-102 Reade street, New York.

**L**IBERALLY EDUCATED young man of 35, with 14 years' experience in hardware business, is open for engagement; competent buyer, thoroughly posted in all the detail of general hardware, railroad, mill and mining supplies; for past six years buyer and office manager for one of the largest jobbing houses in the country; qualified by education and training to fill position of trust and responsibility; very best references. Address "COMPETENT," Box 316, office of *The Iron Age*, 96-102 Reade street, New York.

**R**OLLING MILL Machinist desires a change as a Mechanical Engineer or mill machinist of rolling mills; has been mill machinist of rolling mills for the last 20 years, of steel mills and iron mills; am a man of 48 years of age, of 30 years' practical experience of handling machinery, managing of men; can furnish the best of references as to mechanical ability and character. Address "ROLLING MILL MACHINIST," office of *The Iron Age*, 96-102 Reade street, New York.

**A**N EXPERIENCED and competent builders' hardware Salesman to figure from blue prints and take off specifications on large mercantile and residence buildings in the city of St. Louis; must be thoroughly conversant with all kinds of fine builders' hardware; satisfactory references required. Address "H. W.," office of *The Iron Age*, Bank of Commerce Building, St. Louis.

**BY** A THOROUGH Mechanic to take charge of hardware factory; practical pattern and tool maker and posted in all the departments; long experience in handling men; references. Address "BEN," office of *The Iron Age*, 96-102 Reade St., New York.

**S**ALESMAN, with an experience of 13 years in jobbing and retail hardware, desires permanent engagement with responsible builders' hardware firm; capable of filling position as buyer; exceptional references. Address "BRONZE HARDWARE," office of *The Iron Age*, 59 Dearborn St., Chicago.

**A** YOUNG MAN having six years' experience in the wholesale hardware and supply business desires position; can furnish best of references. Address "THOROUGH," No. 39, office of *The Iron Age*, 96-102 Reade St., N. Y.

**A** FOREMAN of 20 years' experience in rolling mill desires a situation; has a thorough recommendation from last employers; they say he is "capable of superintending the building and rebuilding of puddling furnaces and general repairs to puddling mill, and is, in every way, a reliable and sober man." Address "FOREMAN," Lock Box 1086, Philadelphia.

**A**S ROLLER for hoop, bar or guide iron; well posted on all kinds of fancy work; can give good references. Apply to "T. W. T.," 55 Mont Morenci St., Pt. St. Charles, Montreal.

**R**ESPONSIBLE position wanted by a graduated chemist and engineer; superintendency or assistant superintendency in steel works or blast furnaces preferred; is a metallurgist and can burden furnace; is well up in modern engineering practice; thoroughly understands machinery and the economies of production; can design and build mills or furnace plants. Address "MODERN ENGINEERING," office of *The Iron Age*, 96-102 Reade St., N. Y.

**A** YOUNG MAN, having 15 years' experience in charge of the finishing and electroplating department of large manufacturing company, wishes to locate with some concern where he may have a position of trust; can furnish the best of references as to ability and character. Address "BAUFFE," office of *The Iron Age*, 96-102 Reade St., New York.

**A**SSISTANT SUPERINTENDENT of rolling mills, by a practical and experienced man, age 42; well up in all the details of mill work, both iron and steel, plates and sheets, skelp, bar, guide and structural work; can use gas, oil and coal fuel; best of references. Address "PLATES AND SHEETS," office of *The Iron Age*, 96-102 Reade Street, New York.

**P**LATE AND SHEET MILL Manager of many years' experience desires an engagement; can furnish the best of references. Address "PLATE MILL," office of *The Iron Age*, Rooms 22-24 Pickering Building, Cincinnati, O.

**H**ARDWARE MAN, age 38, proprietor 14 years retail store, wants position; thorough knowledge of general and builders' hardware; good manager, cashier, bookkeeper, &c.; references All. Address, with information as to position, &c., "WELL POSTED," office of *The Iron Age*, 96-102 Reade St., New York.

**A**S SUPERINTENDENT of iron or steel mill by a thorough practical mill superintendent; am especially adapted for position as builder of mills, having built four or five, and can furnish best of references from former employers; will go to any part of America or Mexico. Address "BUILDER," office of *The Iron Age*, 96-102 Reade St., New York.

**M**ILL SUPERINTENDENT; an energetic man, age 33, having 12 years' practical experience, Eastern and Western Pennsylvania, as Mill Superintendent and assistant in steel forging and rolling, besides a good sound knowledge of business and ability to organize and handle men, desires a position; first-class references; is now with a Steel Co. in Pittsburgh. Address "MILL SUPT.," office of *The Iron Age*, 96-102 Reade St., New York.

**PRICE BOOKS.****THE IRON AGE****HARDWARE****PRICE BOOKS,****A, B, C, D, E AND F.**

Arranged in blank form, convenient for the hardware and metal trades, for pocket and office use.  
Send for illustrated catalogue of books for Hardwaremen, giving descriptions and prices.

**The Iron Age HARDWARE Price Books.**

Bound in Grain Seal Leather.

**BOOK A, Four Editions.**

4x7 Inches.

A, 200 pp. .... \$1.00  
A F, 200 pp., with flap. .... 1.25  
A 2, 400 pp. .... 1.50  
A F 2, 400 pp., with flap. .... 1.75

**BOOK B, Four Editions.**

4x7 Inches.

B, 200 pp. .... \$1.00  
B F, 200 pp., with flap. .... 1.25  
B 2, 400 pp. .... 1.50  
B F 2, 400 pp., with flap. .... 1.75

**BOOK C, Four Editions.**

4½x8 Inches.

C, 200 pp. .... \$1.00  
C F, 200 pp., with flap. .... 1.25  
C 2, 400 pp. .... 1.50  
C F 2, 400 pp., with flap. .... 1.75

**BOOK D, Four Editions.**

5x8 Inches.

D, 240 pp. .... \$2.00  
D F, 240 pp., with flap. .... 2.50  
D 2, 480 pp. .... 3.00  
D F 2, 480 pp., with flap. .... 3.50

**BOOK E.** 7½x10 inches, with pocket, 310 pp 5.00

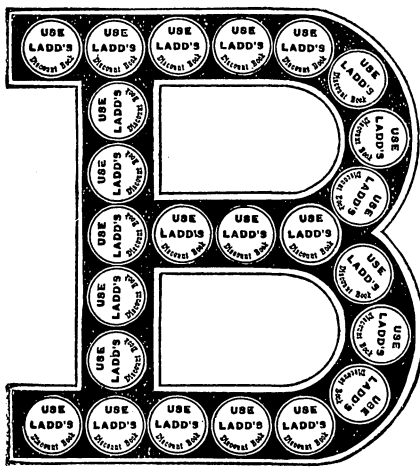
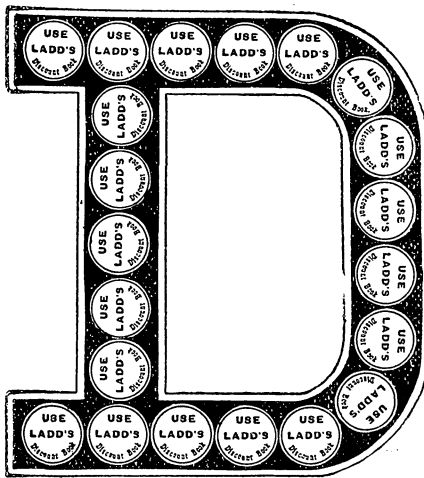
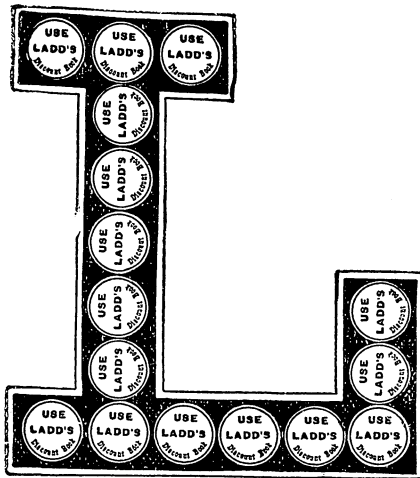
**BOOK F.** 8½x11 inches, with pocket 476 pp 7.50

SENT POSTPAID ON RECEIPT OF PRICE.

DAVID WILLIAMS, Publisher,

96-102 Reade Street, N. Y





**ACCURATE,  
RAPID,  
CONVENIENT,  
PRACTICAL.**

**PRICE, THREE DOLLARS.  
DOUBLE INDEXED EDITION, \$4.00.**

Sent, postpaid, to any address upon receipt of price.

**DAVID WILLIAMS,**

Publisher and Bookseller,

96-102 Reade St., New York.

## Ferracute Machine Co.

BRIDGETON, N. J., U. S. A.,

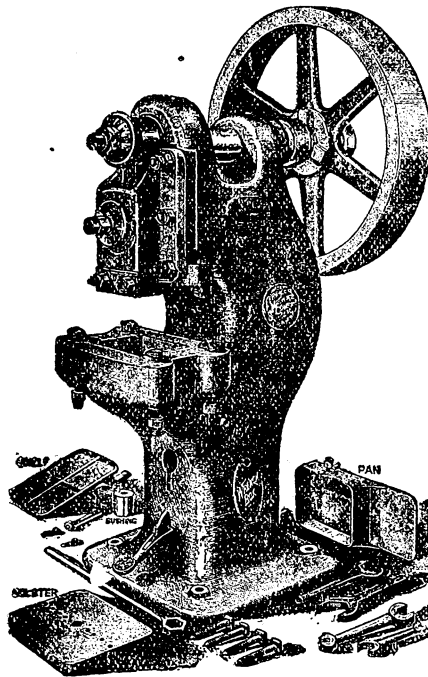
MANUFACTURERS OF

FOOT AND POWER

# PRESSES, DIES,

AND ALL OTHER

Tools for Bar and Sheet Metals.



Send for Illustrated Catalogue with sizes, weights and prices of 100 different kinds of Presses and other Tools for Locks, Hardware, Nuts, Washers, Drop Forgings, Railroad, Bridge and other General Machine Shop Work, &c. Also for Tinware, Cans, Boxes, Lamps, and other kinds of Brass Goods.

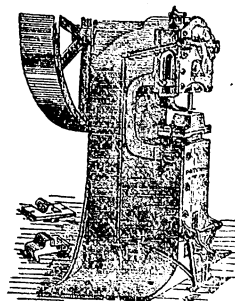
### Rough Casting of Aluminum.

Aluminum Bronze, German Silver Bronze and all kinds of Metals. Manufacturers of Chandeliers, Metal Picture Frames, Ink Stands, Figures, Statues, etc. Stair Carpet Holders a Specialty.

**St. Louis Bronze & Aluminum Works,**

3741-3743 North Broadway,

ST. LOUIS, MO.

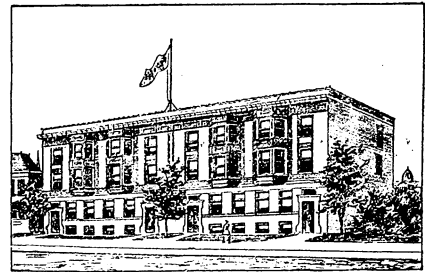
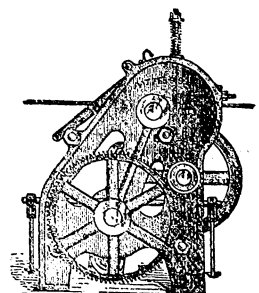


Machine for Punching, Shearing, Stamping, Forging, &c. The lower die-holder is movable when used for Forging Stamping, Bending, &c. This machine can be put up in any part of the building.

**H. A. SCHNEEKLOTH,**

Patentee and Manufacturer

530 W. 28th St., New York.



## DO YOU KNOW THE AUDUBON HOTEL

Is taking advance engagements at low rates? **THE AUDUBON** is fire proof, **THE AUDUBON** will be

## Hardware Headquarters

in Exposition times.

BEDFORD STONE and PRESSED BRICK.

Modern appliances. A catalogue of rates, diagrams of floors, &c., should have been sent to you. If not received, one will be mailed to you on application.

**BUSINESS OFFICE:**

1433 Masonic Temple. Chicago.

**MONTROSS & COOLIDGE,** Proprietors.

## LAMBERSON'S

Old Reliable

## HARDWARE PRICE BOOKS.

Send for new Illustrated Circular.

**BUELL LAMBERSON,**

PORTLAND, OREGON.

## KEEP BOOKS

by WEST'S New Original-ENTRY LEDGER.

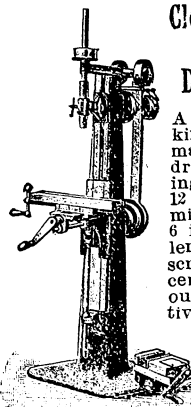
Make the same entry but once. A Ledger in place of a full set of books. Convenient forms for all entries. Easily applied, simple, saves time. West's Self-Proving Balance locates every error. Send 2-cent stamps for illustrated 16-page pamphlet.

**WOLCOTT & WEST, SYRACUSE, N. Y.**

### Clough's Vertical Miller

AND

### Drill Press Combined.



A valuable machine for all kinds of Die work and Tool making, requiring milling, drilling and profiling. Sliding head instantly adjusted 12 in. on column. Table has micrometer adjustment of 6 in., 12 in. and 18 in. cross, lengthwise and vertically by screw. No enterprising concern can afford to do without this machine. Descriptive circular and prices sent on application.

**R. M. CLOUGH,**  
TOLLAND, CONN.

# BUFFALO BLACKSMITH DRILLS

**BUFFALO FORGE CO.,**

Philadelphia, Pa., 704 Arch St.

Buffalo, N. Y.

Chicago, Ill., Room 1306 Auditorium Tower.

# BUFFALO PUNCH AND SHEAR.



## A PIRATE IN THE HARDWARE TRADE

If from any cause, you have goods to offer at specially low figures, for SPOT CASE, either first or second quality, that you wish disposed of, without danger of interference with your regular trade, address as below, with full particulars. We handle jobs only.

F. E. BAILEY & CO.,

225 Dearborn St.,

CHICAGO.



The Scattergood

Time Record and

Pay Roll Book

(Pat. Oct. 13, 1891.)

Address for Circular to

HENRY W. SCATTERGOOD.

23 Richmond St., Phila., Pa.

**EXPERIMENTAL WORK** of every description—mechanical and electrical. Contractors for the manufacture of specialties, or can furnish complete plants for their manufacture. Make Dies, Special Tools, Gauges, Drawings, Patterns, Models. Inventions perfected. Estimates furnished. Correspondence solicited. Automatic Labor Saving Machinery a specialty.

BRADY MFG. CO.,

83 Washington St., Brooklyn, N. Y.

## THE ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

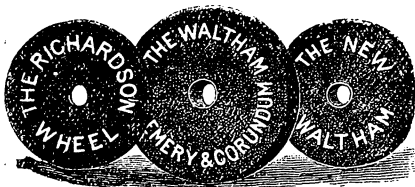
Rails, Splices and Cars. Analytical and Physical Laboratories. Examination of Iron and Steel Works and advice on Processes.

General Office: The Rookery, Chicago. Branch Offices: Hamilton Building Pittsburgh; 28 Chestnut St. Philadelphia. 80 Broadway, New York.

**IF YOU WANT A NIAGARA DYNAMO OR MOTOR,**

or if you are a dealer and want an Agency, send for our Catalogue and Price-List.

LOVELL MFG. CO., LTD., ERIE, PA.



**WALTHAM EMERY WHEEL CO., Manufacturers**

WALTHAM, MASS.

By our various processes we can insure satisfaction for the greatest variety of work.

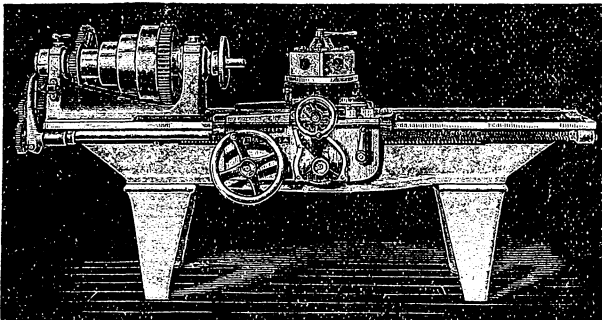
**EMERY WHEEL MACHINERY, EMERY, CORUNDUM, &c.**

**FOR NUMBERING AND LABELING Boxes, Drawers and Shelves, In Hardware Stores and Factories.**

Send for sample and description of our Handy Box of small gummed Letters and Figures, intended for labeling shelf boxes. Put up especially for the Hardware trade.

**THE TABLET AND TICKET CO., Mfrs.,**  
87-89 Franklin St. Chicago. 99 Franklin St. New York.

**WILLSON'S PAPER LETTERS**

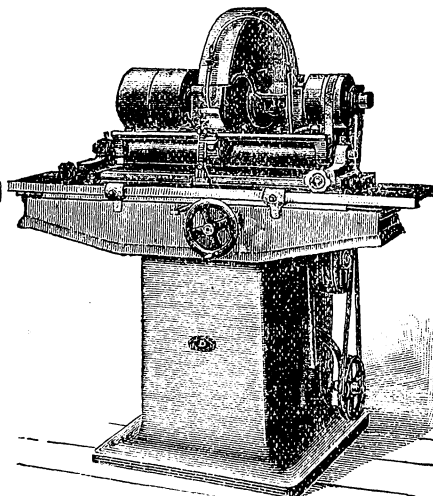
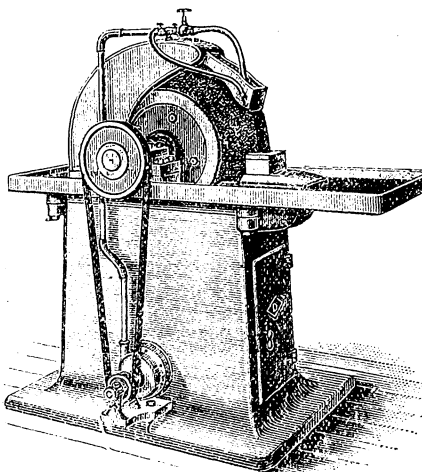


TURRET MACHINES, LATHES, MILLING MACHINES, SPECIAL MACHINERY.

**JOHN L. BOGERT, FLUSHING, N. Y.**

**WATER TOOL GRINDERS.**

**KNIFE GRINDERS.**



No. 2 uses wheel 18 inches x 2½ inches.

No. 3 " " 24 " " 3¼ "

No. 4 " " 30 " " 4 "

No. 5 " " 36 " " 4 "

SEND FOR CATALOGUE AND PRICES.

Only Practical Knife Grinder on the market using water on the wheel effectively to prevent drawing temper from knives. Made to grind knives up to 144 inches in length.

**DIAMOND MACHINE CO.,**

CHICAGO, ILLS.

PROVIDENCE, R. I.



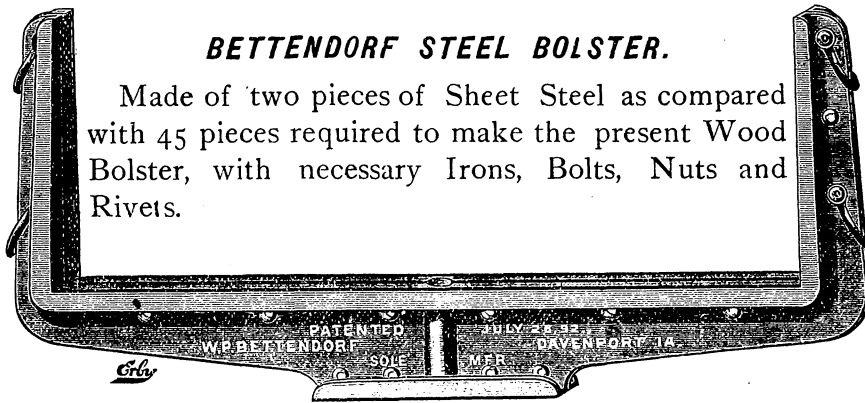
# BETTENDORF HOLLOWSTEEL WAGON AXLES, BOLSTERS AND STAKES.

## BETTENDORF STEEL BOLSTER.

Made of two pieces of Sheet Steel as compared with 45 pieces required to make the present Wood Bolster, with necessary Irons, Bolts, Nuts and Rivets.

**25 %**

Less in weight than wood axles of equal strength.



## GUARANTEE.

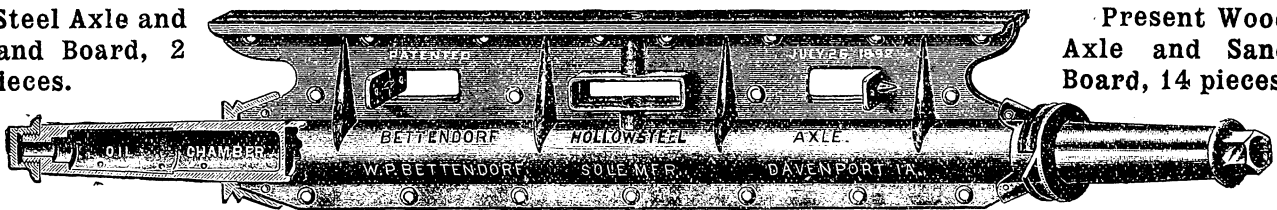
Every axle and bolster warranted.

Any axle broken will be replaced free of charge.

## FRONT AXLE AND SAND BOARD.

Steel Axle and Sand Board, 2 pieces.

Present Wood Axle and Sand Board, 14 pieces.



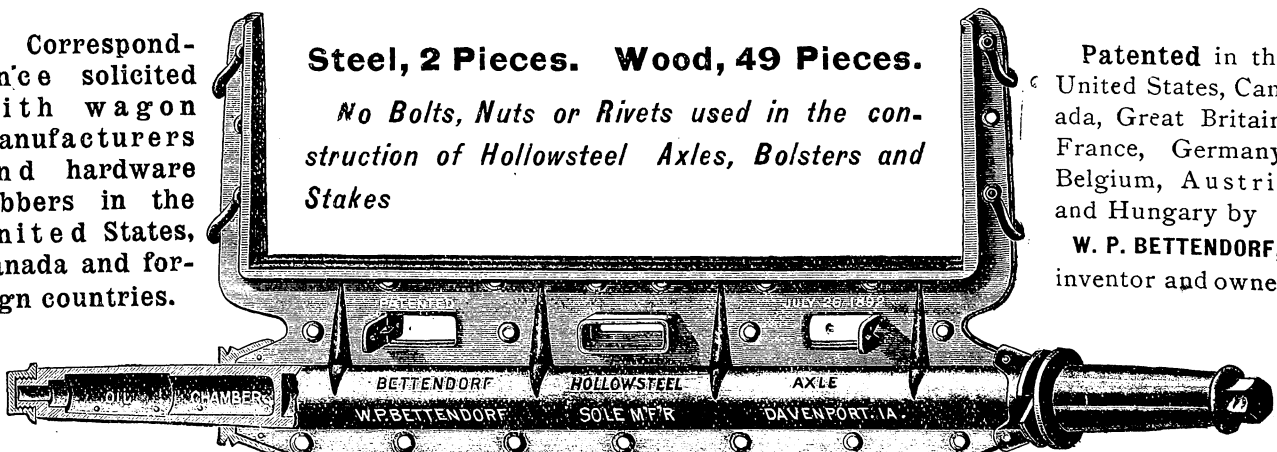
## BETTENDORF COMBINED STAKES, BOLSTER AND SELF-OILING HOLLOWSTEEL AXLE.

Correspondence solicited with wagon manufacturers and hardware jobbers in the United States, Canada and foreign countries.

**Steel, 2 Pieces. Wood, 49 Pieces.**

*No Bolts, Nuts or Rivets used in the construction of Hollowsteel Axles, Bolsters and Stakes*

Patented in the United States, Canada, Great Britain, France, Germany, Belgium, Austria and Hungary by  
**W. P. BETTENDORF,**  
inventor and owner.



Diameter and length of Axle Bearings same as Trade Skeins of same size, and are self-oiling. For descriptive catalogue and price-list apply to

**BETTENDORF HOLLOWSTEEL AXLE WORKS,  
DAVENPORT, IOWA, U. S. A.**

# THE STEEL AND IRON IMPROVEMENT CO.,

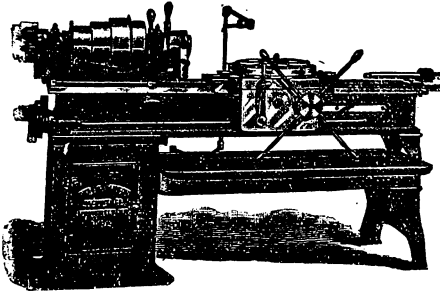
Controlling the Adams-Blair Process and other Steel and Iron Patents.

**High Grade Open Hearth Steel produced by the Adams-Blair Process at less than the Cost of BESSEMER Steel.**

**91 and 98 Fifth Ave., Pittsburgh, Pa.**

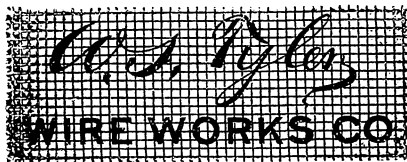
EASTERN OFFICE: 412 Drexel Building, Philadelphia, Pa.

## 2 BY 24 FLAT TURRET LATHE.



SEND FOR CATALOGUE FOR '92.

**Jones & Lamson Machine Co.,**  
SPRINGFIELD, VERMONT, U. S. A.



MANUFACTURERS OF

**"The Tyler"**

Galvanized Poultry Netting.

All Widths and Meshes Carried in Stock,

W. S. TYLER, Pres. PROCTOR PATTERSON, Sec. and  
Treas.  
CLEVELAND, OHIO.

ANALYTICAL AND ASSAY **LABORATORIES**

— OF —  
**DR. GIDEON E. MOORE,**  
221 PEARL ST., (Corner Platt St.,) NEW YORK.

Assays of Ores, Metals and Metallurgical Products of every description.  
Analysis of Water, Ores, Minerals, Metals, Fuel, and Natural and Industrial Products generally.  
PRINTED PRICE-LIST ON APPLICATION.

## ALUMINUM.

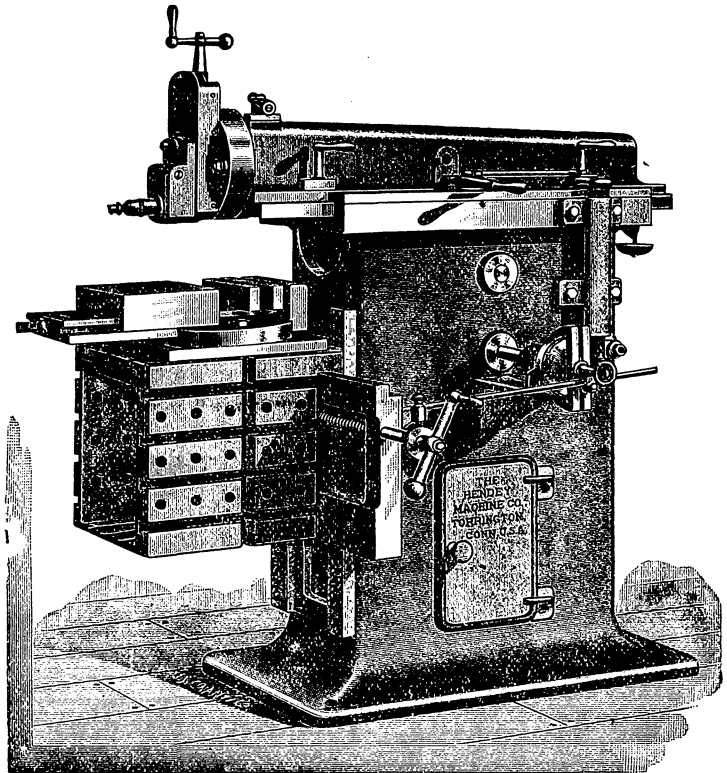
**The Pittsburgh Reduction Co.,**

116 Water St., Pittsburgh, Pa.,

Offer Aluminum guaranteed equal in purity to the best in the market, at lowest rates obtainable.

ALUMINUM SHEET, WIRE,  
AND CASTINGS.

## THE HENDEY MACHINE CO., TORRINGTON, CONN.



Heavy 25 Inch Pillar Shaper with power down feed, large vise and many improvements.

## THE HORIZONTAL BORING MACHINE

has been our chief study for the past four years.

About fifty of our machines are now in use. We have striven to meet our customers' needs, and we have altered and improved our designs with every batch of machines. Our customers say that ours is the simplest and most complete of all the horizontal boring machines made. We think that they are right; and, as we manufacture the machines with especial tools, we can sell them at such prices that no well equipped machine shop can afford to be without one. Send for particulars to the

**NEWARK MACHINE TOOL WORKS, NEWARK, N. J.**

J. A. FAY & CO., Chicago, Western Agents.

THE STEARNS  
LAWN MOWER

**Just a Moment.**

E. C. STEARNS & CO.,  
Syracuse, N. Y.

IS THE  
BEST

# AUSABLE HORSE NAILS.

## THE ORIGINAL

### HOT FORGED and HAMMER POINTED.

By JUDICIAL DECISION.

Extracts of Judge Coxe's opinion. January, 1893.

"The defendant has advertised its nails upon their own merits, believing them to be the best nails manufactured. There has been no deception, no concealment, no false pretences. These nails have entered the market as the **Ausable Nails** and what reputation they have gained has been *under their own name and upon their own merits.*"

**HOT FORGED AND HAMMER POINTED NAILS**  
"were made by the defendant (Ausable) before they were made by the complainant."

"The defendant used the words 'hammer pointed' long before the complainant used them and has so used these words to describe its nails continuously since 1872"

AUSABLE HORSE NAIL CO., 4 Warren St., N. Y.

## White Mountain Freezers.

KNOWN AND APPRECIATED THE WORLD OVER.

RESULT:—The Largest Sale of any Freezer on the market



The "Arctic" Best Freezer at a low price ever introduced.

Are You Selling Them?

WRITE US.

THE WHITE MOUNTAIN FREEZER CO., Nashua, N. H.



### THE OLD RELIABLE STANDARD FREEZER

has the reputation of being the BEST ICE CREAM FREEZER ever introduced. STRENGTH, DURABILITY, NEATNESS AND EFFICIENCY are prominent points in the manufacture. Full Size Can, CEDAR TUB, Detachable Hinged Crossbar, Self-adjusting Vibratory Scraper, etc.

Write for Illustrated Circular, Price-List and Discounts of STANDARD, EXPERT, MODEL and MACHINE Freezers.

CHAS. W. PACKER, Mfr.,

20 North Fourth Street, Philadelphia.

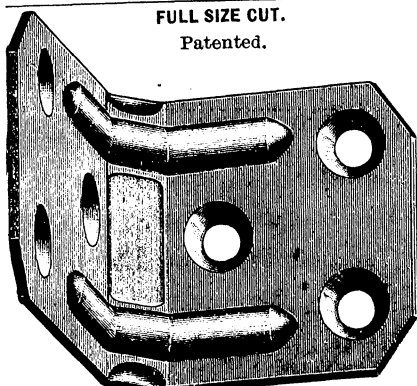
*The Gem Freezer*  
*The Best in the World.*

The simplest, neatest, most convenient and satisfactory for family use, and the leader of all Ice Cream Freezers of established reputation. Imitated by all, equaled by none. Always in the lead.

FOR PRICES AND DISCOUNTS WRITE

NORTH BROS. MFG. CO.,  
MFRS. HARDWARE SPECIALTIES.

American St. and Lehigh Ave., Philadelphia, Pa., U.S.A.



FULL SIZE CUT.  
Patented.

## CORRUGATED STEEL CORNER BRACES.

A SUPERIOR ARTICLE.

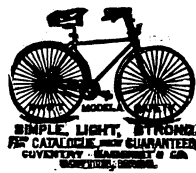
Plain, Japanned or Bronzed.

—SAMPLES AND PRICES ON APPLICATION.—

THE STANLEY WORKS,

New Britain, Conn.

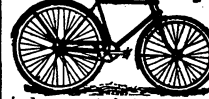
79 Chambers St., N. Y.



We are  
always anxious to  
secure live, responsible  
agents.

Agents Wanted

Oldest and Largest Jobbers of  
Cycles and Sundries



In the U. S. We manufacture, import, and job the most complete line in America, including some 80 styles of new wheels, at unheard of prices. Our superior inducements bring us orders from every State, Territory and large city in the U. S., Canada and Mexico, also ship to Brazil and England. It will pay you to write to us. Prompt shipments guaranteed. Catalogue free. ROUSE, HAZARD & CO., 146 G St., Peoria, Ill.



America's Headquarters for best Snaps, Web, Rope and Leather Halters, Horse and Cattle Ties and other specialties in Saddlery, Coach and General Hardware.

## One Columbia Suggestion

When you buy a bicycle, buy a Columbia, simply because there is no other bicycle so good as a Columbia.

★ All about Columbias  
in a book of Columbias  
★ Free for the asking.

POPE MFG. CO.,

BOSTON. NEW YORK. CHICAGO.

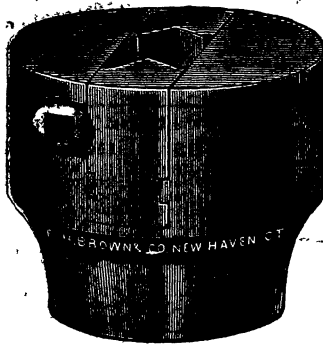
# REID DRILL CHUCKS.

## THREE SIZES.

No. 0 takes any drill from 0 to 1-2 inch inclusive.

No. 1 " " " " 0 " 3-4 " "

No. 2 " " " " 0 " 1 " "



They are the strongest and most durable made. Drill absolutely in the center. No twisting or bending necessary if drill is straight. Can be fitted to hollow spindle lathes for working long rods.

SEND FOR CIRCULAR.

R. H. BROWN & CO., - New Haven, Conn.

## TOOL CABINET.

*You take no risk on the quality.  
We make only the best!*



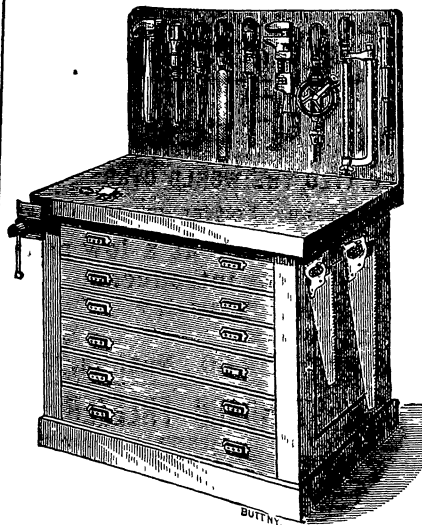
**Sand  
Papers**  
IN  
Reams and Rolls

Flint Paper  
Garnet Paper  
Emery Paper  
Emery Cloth

HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

**BAEDER, ADAMSON & Co.**

730 MARKET STREET, PHILADELPHIA.  
67 BECKMAN STREET, NEW YORK.  
143 MILK STREET, BOSTON.  
182 LAKE STREET, CHICAGO.



This is a Work Bench and Tool Chest combined, for the use of those who wish to do work in their houses. It is made of solid white ash, with hard maple bench plank, and looks like a nice piece of furniture in a room.

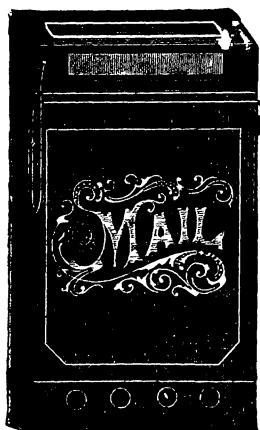
The Cabinet is 18 x 34 x 36 inches. It is furnished with a steel faced vise of a new pattern, and Patent Bench Stop.

It has a detachable back board with racks for tools, as seen in the cut. There are six drawers, of varying depths, for holding Tools, Nails, Screws, Brads, &c, being much more convenient than any Tool Chest now in use.

We will ship the Cabinet to any address on receipt of \$20.00, or it may be had of most Hardware Dealers who buy from us.

## MILLERS FALLS CO.,

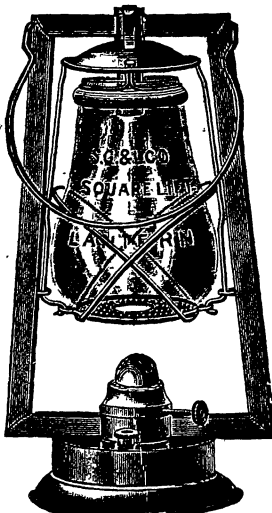
93 READE ST., NEW YORK.



Specialties  
for the  
Hardware  
Trade.  
Cash and  
Bond  
Boxes.  
Bill and  
Change  
Boxes.

Office and House Boxes for Mail Delivery.  
House Furnishing Japanned Ware (High Grade).

**MERRIAM MFG. CO.,**  
DURHAM, CONN.



Square Lift Wire Lan-  
tern. Open.

## Steam Gauge and Lantern Co.

Syracuse, N. Y.

Western Branch: 25 Lake St., Chicago, Ill.

—MANUFACTURERS OF—

## Standard Tubular Lamps and Lanterns.

THE BEST IN THE WORLD.

Tubular Lanterns,

Tubular Street Lamps,

Tubular Hanging Lamps,

Tubular Station Lamps,

Tubular Driving Lamps. etc.

# THE YALE & TOWNE MFG. COMPANY,

OWNING AND OPERATING

THE YALE LOCK MFG. COMPANY.

THE WESTON CRANE COMPANY.

**Lessee, Branford Lock Works.**

OFFICE AND WORKS, STAMFORD, CONN.

Ornamental Metal Work, Locks and Builders' Hardware for every purpose.

Catalogues and full information furnished on application at any of our houses.

NEW YORK.

CHICAGO.

PHILADELPHIA.

BOSTON.

84-86 Chambers Street. 152-154 Wabash Ave.

1120 Market St.

224 Franklin Street.

THE DEALER who sells what  
THE PEOPLE ask for  
MAKES FRIENDS and MONEY, and  
SAVES TIME and TROUBLE.

The people ask for

**LePage's  
Liquid  
Glue,** And the people are right.

It is the strongest and best glue made. It has been imitated, but never equalled. Be sure to get what you order and ACCEPT NO SUBSTITUTES.

Our name is on every label

**RUSSIA CEMENT CO.,**

GLOUCESTER, MASS.

New York Office, 95 Reade and 113 Chambers Streets.

Pacific Coast Office, 23 Davis Street, San Francisco, Cal.

**STEEL RULES,  
HARDENED ENDS.**

Also a full line of

**MACHINISTS' FINE TOOLS.**

If you haven't our 1893 catalog send us a postal card.

**STANDARD TOOL CO.,**

ATHOL, MASS., U. S. A.

ATHOL MACHINE CO., Selling Agents.

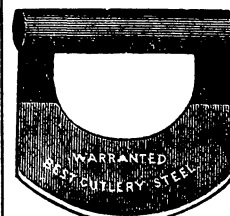
**JESSE JONES & CO.,  
HARDWARE  
SHELF BOXES**

Made of Wood.  
No screws or  
nails used to work  
out and cut  
your shelving.

**615 Commerce St. Phila.**

Send for circular and list of references.

**THE GEM  
SOLID STEEL MINCER**



Single  
and  
Double Blades.

Handle and Blade Formed in one piece.  
Always Clean. Indestructible.  
No Rivets to Wear Loose.  
No Wooden Handle to Shrink, Swell, Loosen,  
Split, or Fill with Rancid Grease.

MANUFACTURED BY

**PALMER HARDWARE MFG. CO.**

TROY, N. Y.

**ELIZABETHPORT CORDAGE CO.**

Manufacturers of

**ROPE AND BINDER TWINE,**

46 South Street, New York.

# W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

## Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

## DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

A LARGE CAPACITY, AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries,

Fig. 190.

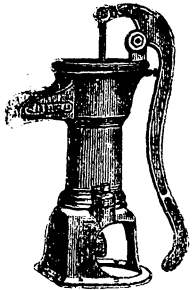
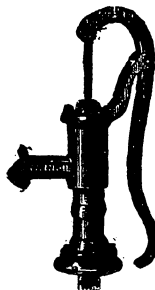


Fig. 76.



or wherever it is desired to raise a large quantity of water by hand power.

The pump has large valves (accessible by hand) and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

Capacity from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced.

Made either as shown in cut for Hose or for IRON Pipe Suction underneath.

Send for Circular and Price List.

Fig. 209.

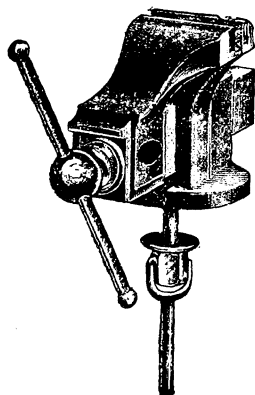


Fig. 381



**THE DEMING**  
FACTORY  
SALEM, O. U.S.A.  
MANUFACTURERS OF  
HAND & POWER PUMPS, WELL SUPPLIES & C. VERTICAL STEAM PUMPING ENGINES.  
N.Y. OFFICE: 72 JOHN ST.  
HENION & HUBBELL  
GEN'L. WESTERN AGTS.  
55 & 57 N. CLINTON ST.  
CHICAGO, ILL.

**A NEW CHAIN PUMP**  
KEBLER'S PATENT  
Galvanized Iron Tubing  
FOR CHAIN PUMP.  
Is guaranteed to be  
**THE BEST.**  
IT is made of best quality Galvanized Iron, which will not rust nor accumulate filth.  
IT only weighs one-half pound to the foot, wet or dry, while wood tubing saturated with water weighs six pounds or more per foot.  
IT will last longer than wood tubing.  
IT will not freeze in any climate.  
IT can be attached to any make of curb.  
We also manufacture a Galvanized (all) Iron Curb. Address  
**BELLEVUE PUMP CO.,**  
Sole Mfrs., BELLEVUE, IOWA.  
OR **A. F. SHAPLEIGH HDW. CO., St. Louis.**  
Agents for Southern Territory.



**HOLLANDS' OFFSET JAW VISE.**

Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

Hollands Mfg. Co.,  
ERIE, PA.,  
Manufacturers all styles VISES.

# F.E. MYERS & BRO.

**WORLD'S FAIR**  
**LIFT PUMPS**  
**ASHLAND, O.**  
+ CATALOGUES FREE +  
T ASHLAND PUMP & HAY TOOL WORKS

**BOOKS** YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing **DAVID WILLIAMS**, Publisher and Bookseller, 96-102 Reade Street, New York.



STRONGEST.

NEATEST.

# WARNER'S BURGLAR PROOF LOCKS.

LIGHTEST.

SAFEST.

**J. M. KING & CO.,**  
WATERFORD, N. Y.

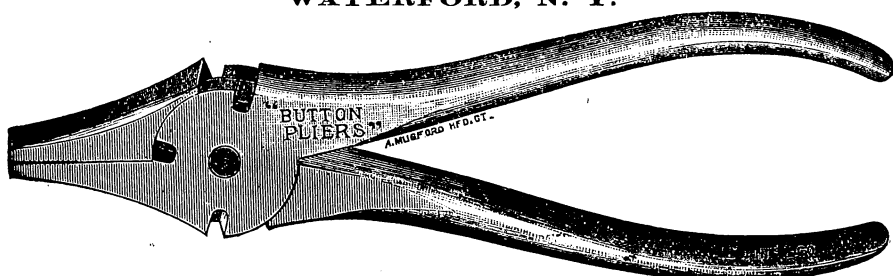
Manufacturers of  
**BUTTON'S**

**Pat. Wire Cutter  
AND PLIER COMBINED.**

Specially Adapted for Use on Wire Fence.

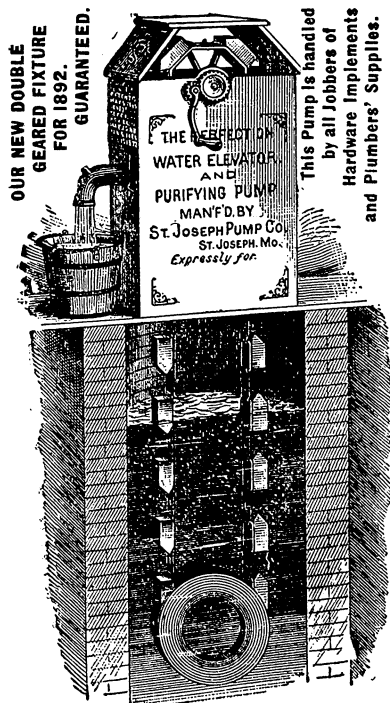
Also Manufacturers of BLACKSMITHS' and  
MACHINISTS' STOCKS and DIES, PLUG and  
TAPER TAPS, HAND, NUT and SCREW  
TAPS, PIPE TAPS and REAMERS.

Price-List on Application.



Established by DANIEL B. KING, 1829.

## COLUMBUS



discovered America in 1492.

Nearly 400 years later the great

**PERFECTION WATER ELEVATOR**

AND

**PURIFYING PUMP**

was discovered.

Both Columbus and the Perfection Pump were necessary for the success of this country.

A dealer wanted in every town. Be sure you get "The Perfection." Take no other. For full information, circulars, catalogues, etc., address the manufacturers, mentioning this paper.

**ST. JOSEPH PUMP CO.,**

ST. JOSEPH, MO., U. S. A.

E. A. KING, Secretary and Gen'l Manager.

BUSINESS ESTABLISHED  
1798.

INCORPORATED  
1891.

**JOS. F. McCOY CO.,**

26 Warren St., New York,

—Importers and Dealers in—

**HARDWARE, CUTLERY, TOOLS**

—AND—

**RAILWAY SPECIALTIES.**

SOLE AGENTS FOR

Monarch Cutlery Co., { Pocket Cutlery, Scissors, Tools, etc.  
Irving Cutlery Co., {  
George Butler & Co., { Razors, Table Cutlery, etc.  
Warrington Shear Co., { Warranted Shears, Scissors, etc.  
Peugeot Frères, { Celebrated "Lion" Band Saws, Tools, etc.  
Gueutal & Sons, { Celebrated French Pliers and Jewelers' Tools.  
Coates Clipper Mfg. Co., { Patent Horse and Hair Clippers.  
Tangyes, Limited, { Hydraulic Jacks, Blocks, etc.  
Wm. Eades, Son & Co., { Patent Differential Pulley Blocks.  
Weston's Patent Ratchet Drills.  
Weiller & Co., Brass Wire Cloth.

Headquarters for

Empire Knife Co. and La Belle Cutlery Co.

**P. J. Conroy & Co.**

Paschall, PHILADELPHIA.

**'CONROY'  
Refrigerator Door  
Fasteners**

Have rapidly supplanted all others

Refrigerator Trimmings.



Pat. Dec. 15 85.



**WORTHLEY'S "SLOW FEED" MANGER.**

"A Great Teacher." "A Good Scheme." "A New Idea."

The seven one-pint cells prevent waste and bolting. Used by Boston Veterinary Hospital and 5000 others. 17 inch, 25 lb. size, price, \$1.60.

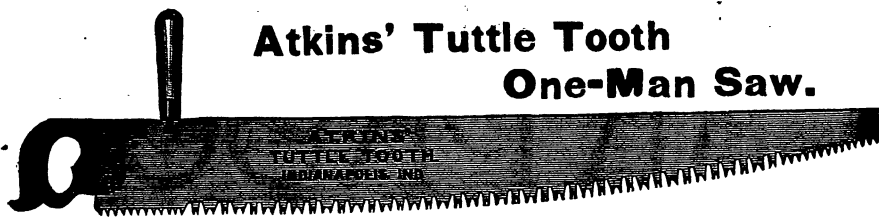
They nest together easily. Freight Rates are extra low. Shipped from New York, New Haven or Boston f.o.b. Discounts Liberal. Send for Catalogue of Hay Racks, Guards, &c.

WORTHLEY'S BROAD GAUGE IRON STALL WORKS, 53 Elm St., Boston, Mass.

# E. C. ATKINS & CO., Indianapolis, Indiana.

We make a Specialty of Fine High-Grade Saws.

## Atkins' Tuttle Tooth One-Man Saw.

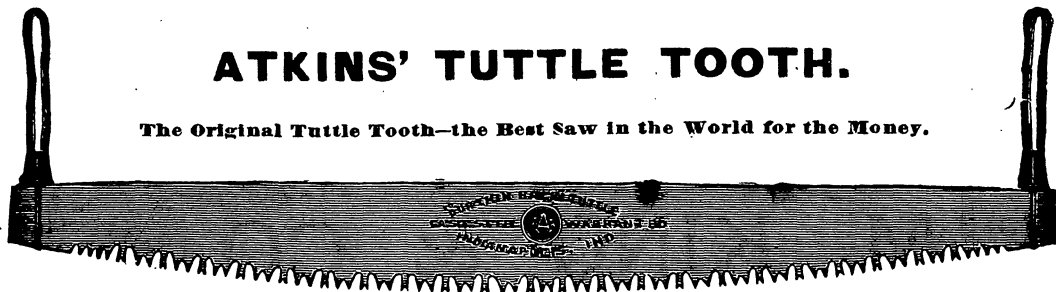


### BRANCH HOUSES:

Memphis, Tenn.  
Chattanooga, Tenn.  
Minneapolis, Minn.

## ATKINS' TUTTLE TOOTH.

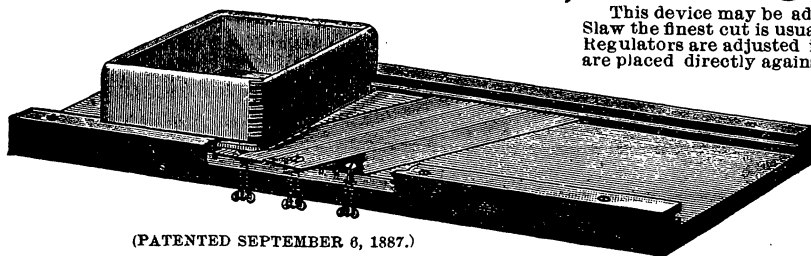
The Original Tuttle Tooth—the Best Saw in the World for the Money.



# PATENT ADJUSTABLE KNIFE KRAUT CUTTER.

MANUFACTURED BY

**NATIONAL SAW CO., 96 and 98 Reade St., New York.**



(PATENTED SEPTEMBER 6, 1887.)

This device may be adjusted to cut fine or coarse, as desired. For cutting Slaw the finest cut is usually the most desirable. To make the finest cut the Wire Regulators are adjusted in line with the Cutter, or in other words, these wires are placed directly against the back edge of the Cutters. To make the coarsest cut, the Regulators are turned until the leg comes against the side strip. If a medium cut is desired, the regulators are turned half way around: thus the desired cut may be obtained by the position of the Regulators. To change the position of the regulators, the bolts passing through the blades are first loosened, the regulators turned to the desired position and the bolts again tightened. To sharpen the blades, take out the retaining bolts, when the blades may be removed; after sharpening, the bolts are replaced, the Regulators adjusted to the desired cut and the bolts tightened.

## Three Essentials

IN THE MODERN  
CROSS-CUT SAW.

- 1.—Teeth of uniform thickness.
- 2.—Five Gauges taper in middle of blade.
- 3.—Three Gauges heavier on ends than in center of back.

For **10 YEARS** the Simonds Crescent-ground Cross-cut Saw (the only Saw on the market possessing these **ESSENTIALS**) has stood out prominently in contrast with all other makes of cross-cut saws. It has been the **CRESCENT-GROUND** against the **FIELD-MODERN IDEAS** against **ANCIENT METHODS**.

**TO-DAY** the Crescent-ground Saw is in use in every important lumber camp in the United States. Manufacturers have endeavored to imitate it, but the Machinery producing the Saw, the Process by which it is produced, and **THE SAW**, are patented. All imitations are but involuntary acknowledgments of the **SUPERIORITY** of

**THE CRESCENT-GROUND CROSS-CUT SAW.**

(PATENTED DEC. 26, 1882.)

**SIMONDS MFG. CO.,**

**FITCHBURG, MASS.**

**CHICAGO, ILL.**

**SIMONDS SAW CO.,**

**SAN FRANCISCO, CAL.**

**PORTLAND, ORE.**

CARPENTERS' & MACHINISTS'

## IRON BENCH LEVEL

WITH DOUBLE PLUMB.

No. 5. 6 in.



MANUFACTURED BY

**C. F. RICHARDSON & SON,**

**ATHOL, MASS.**



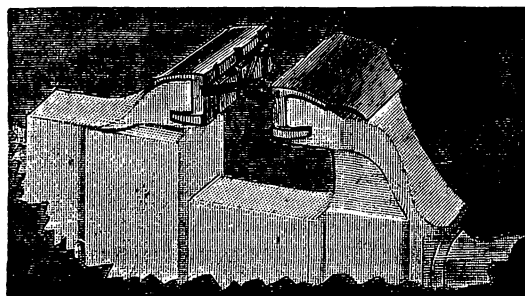
Send for  
PRICE LIST

**RICHARDSON BROS.**

ESTD 1860.

NEWARK N.J.

INC'D 1890.



## BINGHAM PATENT VISE JAW CAP

Will Fit any Kind of Vise.

For protecting finished work. Will hold finished rods of any shape without injury.

3 1/4 inch, ..... per pair, 40 cents.  
4 " " " " 50 "  
4 1/2 " " " " 60 "

**PRENTISS VISE CO.,**

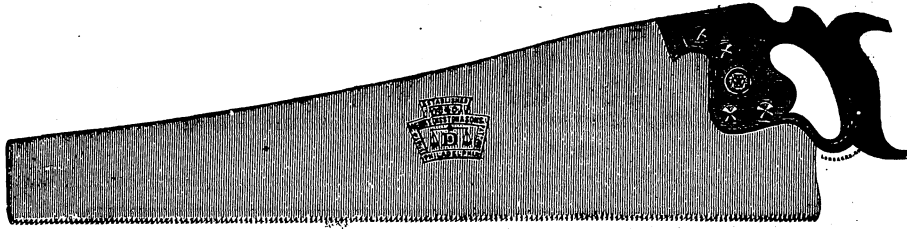
44 Barclay St., New York.

"If you want a Saw it is best to get one with a name on it which has a reputation. A man who has made a reputation for his goods knows its value as well as its cost and will maintain it."—HENRY DISSTON.

# THE SAWS THAT LEAD THEM ALL

## DISSTON & SONS' PATENT D-8 HAND SAW.

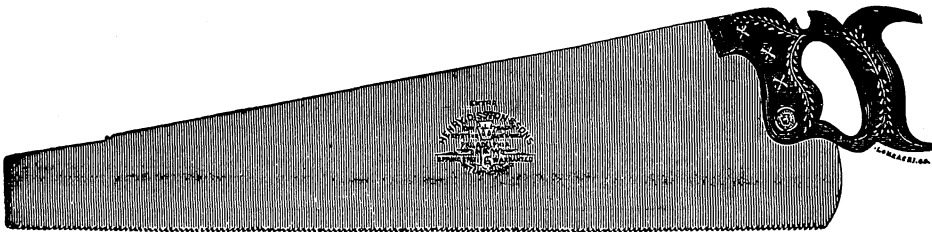
"THE  
SAW;"  
HOW  
TO  
CHOOSE  
IT,  
AND  
HOW  
TO  
KEEP  
IN  
ORDER,  
Sent  
Free  
on  
Receipt  
of  
Name  
and  
Post Office  
Address.



This Saw combines all the valuable improvements in Hand Saws that have been made by us of late. The first and most important is the hollow or skew back, the success of which can best be attested by the number sold. The peculiar shape of the butt or heel, coupled with the new method of fastening to the handle, give a full stroke of the blade without fear of catching or hooking in the work; and as the handle is put further on the blade you have a full stop on the proper point and a greater command over your Saw, by reason of being two inches nearer the point, which must give more power.

The Saw being let into the handle on a circle, has a perfect bearing, which, with the new screws, makes it stronger and almost impossible to work loose, and avoids the unsightly gap that is seen on the back of the old style handle. All the above features are patented.

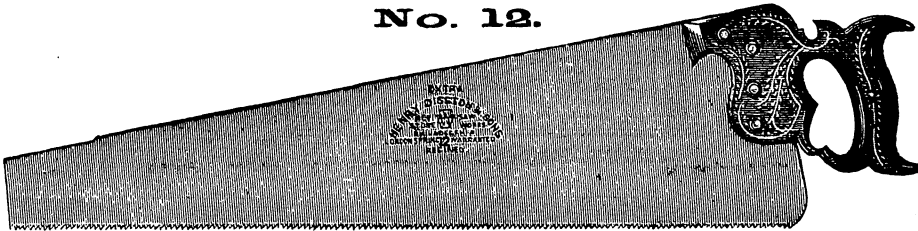
## Our New No. 16 Premium Saw.



AN EXTRA FINE SAW IN EVERY RESPECT.

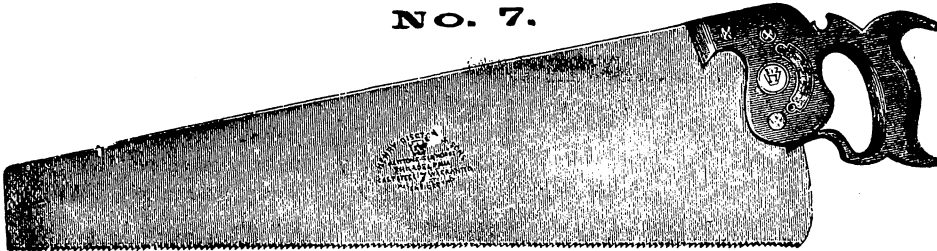
Having the Latest Close up Handle, Spring Steel Blade, Extra Thin Back, Finely Grained, with an Apple Handle and Four Brass Centennial Screws.

## No. 12.



DISSTON & SONS' Extra Refined London Spring Steel, Selected and highly Polished Blade, Handle Carved and Polished, 4 Improved Brass Screws, the finest Hand Saw manufactured.

## No. 7.



DISSTON & SONS' Cast-Steel, Warranted, Beech Handle, Polished Edge, 4 Improved Screws, Grained Blade.

"POCKET  
EDITION  
OF  
THE  
SAWYER"  
and  
"LUMBER-  
MAN'S  
HAND  
BOOK,"  
Sent  
Free  
on  
Receipt  
of  
Name  
and  
Post Office  
Address.

ASK YOUR DEALER TO ORDER THEM FOR YOU.

# HENRY DISSTON & SONS

(INCORPORATED),

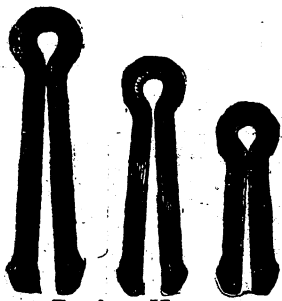
Keystone Saw. Tool, Steel and File Works, Philadelphia. Pa.

FACTORIES AT  
AKRON, - OHIO.  
CANTON, - OHIO.

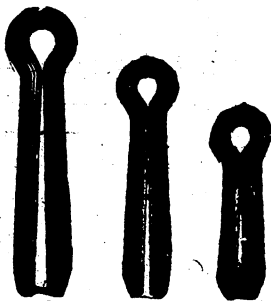
# The Whitman & Barnes Mfg. Co.

FACTORIES AT  
SYRACUSE, - N. Y.  
ST. CATHARINES, ONT.

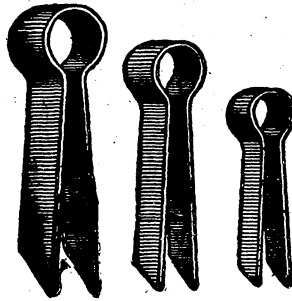
—MANUFACTURERS OF—



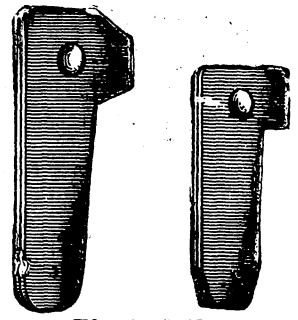
Spring Keys.



Spring Cutters.



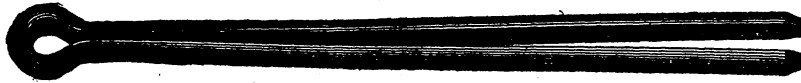
Flat Spring Keys.



Flat Riveted Keys.

BRANCHES AT

79, 85 W. Monroe Street,  
CHICAGO ILL.  
1324 West 11th Street,  
KANSAS CITY, MO.  
126 Main Street,  
CINCINNATI OHIO.



Cellar Box Cutters.

BRANCHES AT

32 So. Market Street,  
BOSTON, MASS.  
1917 Market Street,  
PHILADELPHIA, PA.  
33 Market Street,  
SAN FRANCISCO, CAL.

NEW YORK OFFICE, 102 CHAMBERS ST.

**NICHOLSON FILE CO.**  
PROVIDENCE, R. I.

THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

3000 VARIETIES FILES [X.F.] AND INCREMENT CUT FILES.

Philadelphia, 1876.



**MCCAFFREY FILE CO.,**

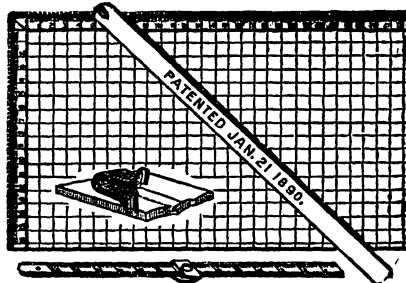
FIFTH and BERKS STS.,

PHILADELPHIA, PA.

For Superiority



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade. Superiority acknowledged wherever used, sold or exhibited.



**The Canton Glass Board.**

Cuts any Fraction of an inch by Eighths.

Unequaled for accuracy and quick work in cutting square or at any angle. Saves breakages, &c.

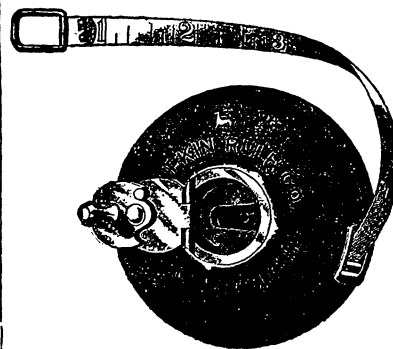
—ALSO—

IMPROVED TRAMMEL RULE for Cutting Circles

From 3 inches up to 48 inches. Segments, Gothic Shapes, &c.

Send for Circular.

The Canton Saw Co., Canton, Ohio.



**"RELIABLE"**  
**Steel Measuring Tapes.**

Entirely new. Handle or crank when closed is perfectly flush with leather case. Opens by pressing button on opposite side and folds out double, giving increased leverage. Best and most convenient steel tape on the market. Fully guaranteed. Will send samples on approval.

**LUFKIN RULE CO., Saginaw, Mich.**

**WM. KROGSrud,**  
Engraver and Die Sinker.  
61 Fulton St., N. Y.,  
Manufacturer of  
**STEEL STAMPS**  
For Every Purpose.  
Steel Letters & Figures.  
Burning Brands, Stencils  
&c. Send for Illustrated  
Catalogue.

**HORACE E. BRITTON,** Stoughton, Mass.,

Manufacturer of the

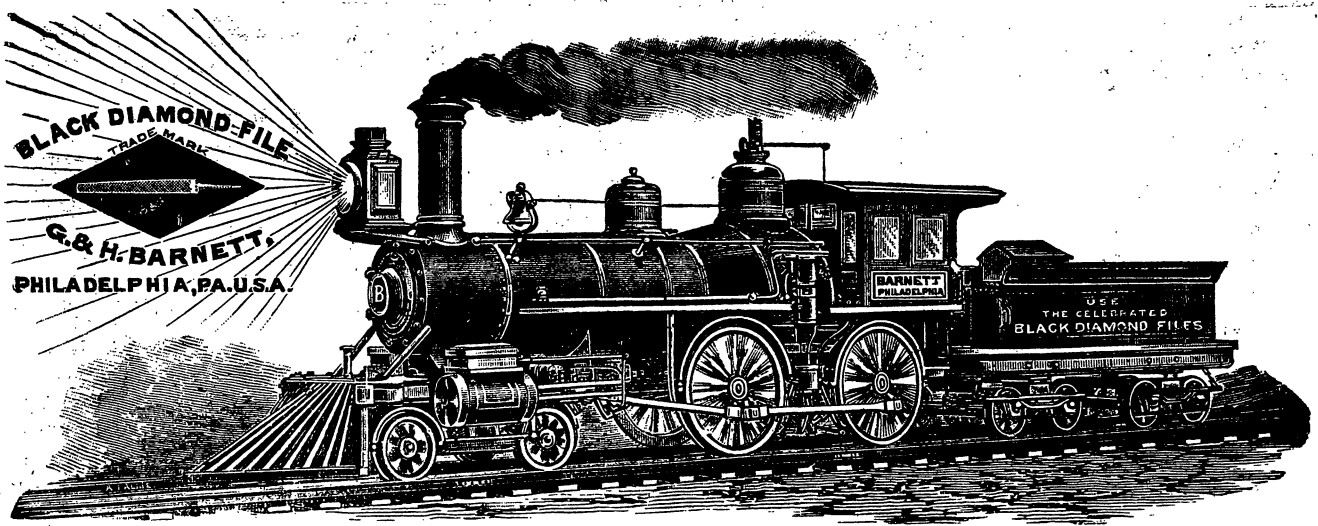
**HENRY'S PATENT COMBINATION HAFT,**

AND OTHER TOOL SPECIALTIES.

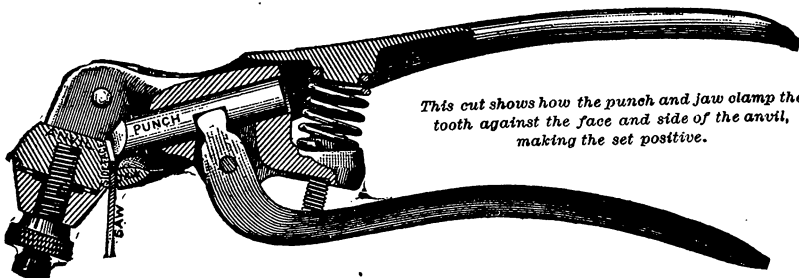


The Combination Haft contains six Brad-Awls, one Chisel, Screw Driver, Diamond Point Awl, Marking Awl, Tack Fuller and Reamer. Send for Circular and Prices.

Full Set Sent Post-paid on receipt of \$1.00. (No stamps.)



## THE TAINTOR POSITIVE SAW SET.



*This cut shows how the punch and jaw clamp the tooth against the face and side of the anvil, making the set positive.*

Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

TAINTOR MFG. CO., New York.

BOSTON, Oct. 27, 1892.

DEAR SIR:—Have tried your Saw Set, and find it the best in every particular and have used a great many different kinds for twenty years.

Yours, etc.,

F. W. SPEARMAN, No. 75 Rutland St., Boston.

For Prices and Discounts, address

**WIEBUSCH & HILGER, Ltd., Sole Agents,**

84 and 86 Chambers Street, New York.

## Lightning Band for Cases and Crates.

(COVERED BY U. S. LETTERS PATENT.)



Mounted on reels and always ready for use and convenient to handle. Easily and quickly binds shipping cases and crates in a neat, strong and substantial manner.

### PRICES:

No. 1, per reel of 2000 ft., \$4.50 net.

No. 2, per reel of 2000 ft., \$4.75 net.

Pliers for cutting wire, 50 cents extra.  
No. 1 for cases under 300 or 400 pounds, and No. 2 for all heavier cases.

Buffalo Specialty Mfg. Co.  
Sole Manufacturers,  
Buffalo, N. Y. U. S. A.

ESTABLISHED 1840.

## A WORD TO THE WISE IS SUFFICIENT

When you purchase a Lantern, Street Lamp or Driving Lamp, remember the

### "DIETZ" Make

is the best. Our goods have stood the test of time and are safe and reliable. The name "DIETZ" is plainly stamped on them. Our specialty is Tubular Lanterns, Street Lamps and Driving Lamps. We make a large variety being the oldest and largest house in our line

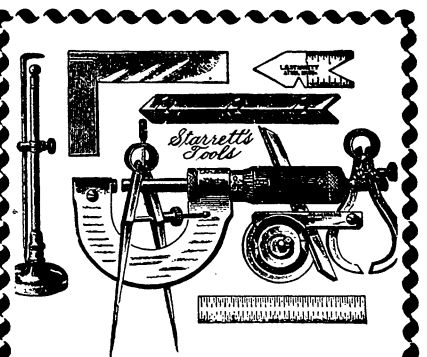
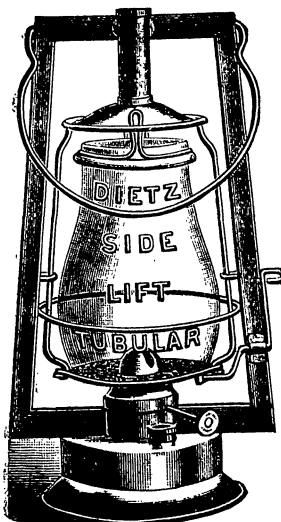
**ASK FOR THEM!**

**R. E. DIETZ COMPANY,**

New York, 60 Light St.

U. S. A.

Chicago, 25 Lake St



## Skilled Mechanics

want tools that are warranted accurate, best in workmanship, latest in design, finest in finish.

## Live Dealers

want tools they can swear by, not at. That can be relied upon to satisfy intelligent customers. That come nicely put up. That pay a good profit.

## Starrett's Tools

meet the requirements of both.

SEND FOR CATALOGUE.

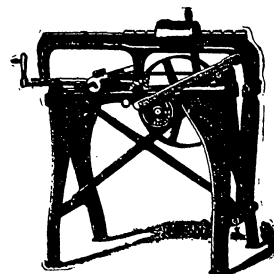
**L. S. STARRETT**

Athol, Mass., U. S. A.

LONDON AGTS: Chas. Churchill & Co., Ltd.,  
21 Cross St., Finsbury, E. C.

## STOVER POWER HACK SAW.

Cuts off any size or Shape of Metal.  
Up to 4½ Inches.



No skill required to run it. When bar is cut off the machine automatically lifts the saw from the work and stops.

The pressure on the saw is much greater on the forward stroke than on the return.

THIS IS THE MOST PRACTICAL MACHINE FOR THE PURPOSE ever offered to the trade. No shop can afford to be without it.

Satisfaction guaranteed. Price, \$25 00  
STOVER NOVELTY WORKS, 22 River St., Freeport

TRADE MARK



# John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,  
against all Competitors, from

**THE YEAR SEVENTEEN HUNDRED & FIFTY,**  
and are still in increasing demand. As in the past, it is the unalterable  
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: SYCAMORE STREET, SHEFFIELD, ENGLAND.

SOLE AGENTS FOR THE UNITED STATES, AND THE CANADAS.

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.

CORPORATE MARK



## JOSEPH RODGERS & SONS, Limited.

—MANUFACTURERS OF—

Pocket and Table Cutlery, Scissors, Razors, Erasers, &c., &c.

These goods have fully maintained their reputation as the best cutlery in the world for over

**ONE HUNDRED AND FIFTY YEARS.**

Any Infringements of our Name and Corporate Mark will be promptly prosecuted.

Sole Agents for the United States,

**ALFRED FIELD & CO., 93 Chambers and 75 Reade Street, New York.**

EVERY  
BLADE  
WARRANTED

# LANDERS FRARY & CLARK,

CUTLERS TO THE AMERICAN PEOPLE.

## TABLE CUTLERY OF EVERY DESCRIPTION AND OF FINEST QUALITY

FACTORIES & OFFICE - NEW BRITAIN, CONN., U. S. A.

SEND FOR CATALOGUE — WRITE FOR PRICES.

EVERY  
BLADE  
WARRANTED

AMERICAN TOOL COMPANY,  
NEW YORK,  
MANUFACTURERS OF

### TOOL CHESTS

Of all sizes, complete with tools, for Hardware, Toy,  
Notion and Variety trades.

200 West Houston Street, near Varick.  
Also Machinists' Tool Chests, empty. Illustrated Cata-  
logue and prices furnished on application.

WHEN IN WANT OF

WOSTENHOLM'S

**I★XL**



Knives or Razors,

SEND TO

FRED. B. GURNEY,

116 Chambers St., N. Y.

"ISN'T IT A DAISY?"

"WHAT?"

**Our New Catalogue.**

"HAVEN'T SEEN IT?"

THEN SEND FOR IT.

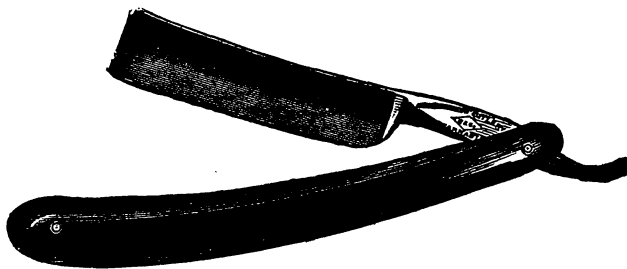
H. H. MAYHEW CO., Shelburne Falls, Mass.

Finest Quality

Steel.

Temper & Finish

Unexcelled.



PRICES ATTRACTIVE. See Catalogue.

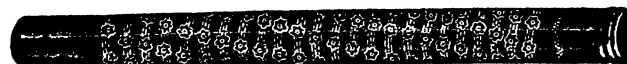
**SOUTHINGTON CUTLERY CO., SOUTHINGTON, CONN.**

## THE FOX SAFETY RAZOR.

(U. S. Patent 484,116, October 11th, 1892.)

Is the finest and most practical in the world.

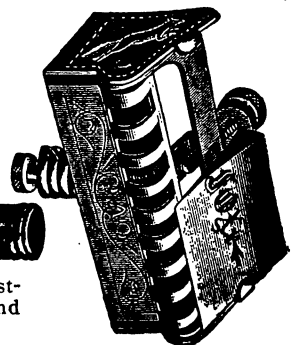
EVERY MAN HIS OWN BARBER.



Makes shaving a luxury; no danger of cutting. Adjust-  
able blade. Silver plated frames. Sole manufacturer and  
patentee,

**E. LOTHAR SCHMITZ, 92 Reade St., New York.**

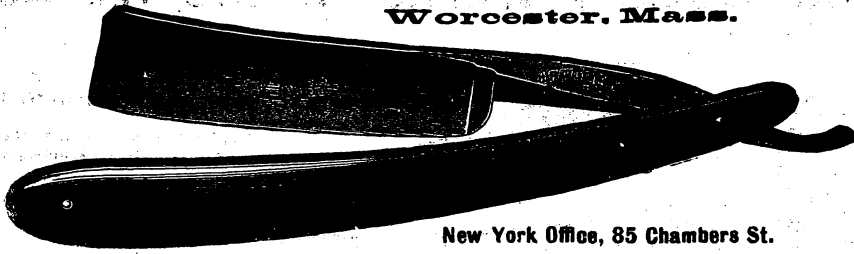
Sold by all the Leading Hardware and Cutlery Houses.





# J. R. TORREY RAZOR CO.,

Worcester, Mass.



New York Office, 85 Chambers St.

Our Razors have become the standard for excellence and are no higher in price than the foreign. We manufacture and carry in stock more than 200 styles. Send for illustrated catalogue.

# THE STANDARD.

## BUCK BROTHERS,

MILLBURY, MASS.

The Most Complete Assortment in the U. S. of  
Shank, Socket Firmer and Socket Framing  
Chisels.



TRADE MARK

## PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also, "Riverlin Works."

Established 1825.

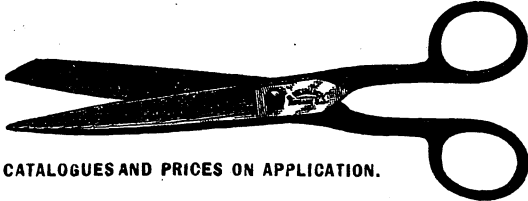
Incorporated 1892.

## R. HEINISCH'S SONS CO.,

NEWARK, N. J., U. S. A.

New York office, No. 90 Chambers St.

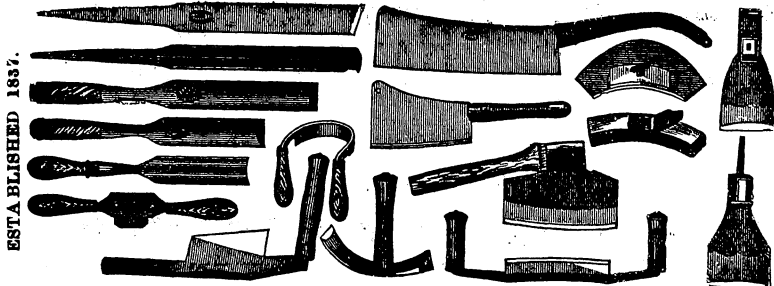
Tailors' Shears, Trimmers, Scissors, Tinnerns' Snips, etc.



CATALOGUES AND PRICES ON APPLICATION.

Our contract with Messrs. H. Boker & Co. as sole agents for the sale our goods expired May 1st, 1892.

HIGHEST AWARD PARIS EXPOSITION, 1889.



ESTABLISHED 1837.

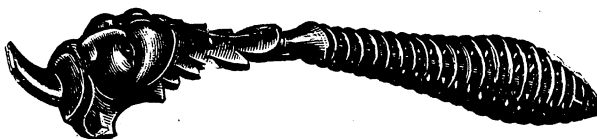
L. & I. J. WHITE, MANUFACTURERS OF EDGE TOOLS.  
BUFFALO, N. Y. Coopers', Carpenters' and Ship Tools, Plane Irons, Cleavers, &c. Full Line Chisels.

# ALASKA

## STOVE TRIMMINGS.

MADE UNDER THE GAITLEY PATENTS.

The Most  
Durable.



## ALWAYS COLD.

Pokers, Lifters, Shovels and Fire Sets. For sale by all First-Class  
Jobbers in Hardware.

MADE ONLY BY

TROY NICKEL WORKS, TROY, N. Y.

# Cast Shears.

ACME SHEAR CO.,

BRIDGEPORT, - CONN.

## MARTEN DOSCHER,

### Commission Hardware.

88 Chambers St., New York.

Agent—G. W. Bradley's Edge  
Tools, Axes, Coopers' Tools,  
Cleavers, Bush Hooks, Draw  
Knives, Ship-Carpenters' Tools,  
&c. Also a full stock of Planes,  
Brooks' Bright Wire Goods,  
Washita Stone and Taunton  
Tack Co.'s Rivets, &c.

Established 1836.

## ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK.

IMPORTERS OF

HARDWARE CUTLERY GUNS, ANVILS  
CHAINS, FILES.

SOLE AGENTS FOR

Joseph Rodgers & Sons, Best Cutlery in the  
world; W. K. & C. Peace, unrivaled Grass Hooks,  
Straw Knives and Scythes; Joseph Elliot & Sons,  
Celebrated Razors; Peugeot Frères, "French  
Toilet" and other Clippers; L. Hugoniot Tissot,  
Fine Steel Pliers, &c.; Eley Bros., Caps, Wads,  
Cartridge Cases, &c.; Webster & Horsfall, Steel  
Wire of every description.

Send for Rodgers' New Illustrated Catalogue.

We manufacture all kinds of

## EDGE TOOLS

of highest grade and sell at proper prices.  
Send for Illustrated Price-List.

Buffalo Edge Tool Works.

308, 310 and 312 William Street,  
BUFFALO, N. Y.

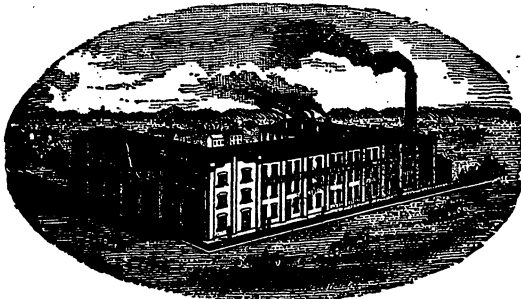
## WM. H. JACOBUS,

No. 90 Chambers St., New York.

New York Office of

J. F. Wollensak.  
Barnes Mfg. Co.  
Penn Lock Works.  
Lorenz Bommer.  
Palmer Hdw. Mfg. Co.  
Dibble Mfg. Co.  
Wire Goods Co.  
Garritt & Beach.  
Prindle Mfg. Co.  
Tuck Mfg. Co.  
Henis Vegetable Press.  
Dille & McGuire Mfg. Co.  
National Rivet Works.  
Lufkin Rule Co.  
Wolcott Hdw. Co.  
Zimmerman's Blind Adjusters.  
Burnside Cedar Faucets.  
Fibre Head Mallet.  
Glazier's Patent Hocks.

# The Best Equipped Cutlery Works in the World.



FACTORY: FOURTH &amp; DICKERSON STS. NEWARK, N. J.

## THE ELECTRIC CUTLERY CO.,

113 Chambers St., N. Y., and Newark, N. J.

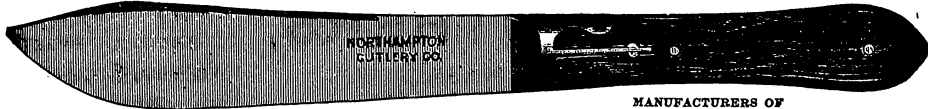
Manufacturers of Razors, Knives,  
Razor Stroops, Scissors and Shears.

(SEND FOR CATALOGUES.)

## NORTHAMPTON CUTLERY COMPANY, NORTHAMPTON, MASS.

NEW YORK

SALESROOM,



122 Chambers

Street.

MANUFACTURERS OF

TABLE CUTLERY, BUTCHERS' CARVERS, PLATED GOODS, &amp;c.

Send for Revised Catalogue.

**W. & S. BUTCHER, Sheffield, England,** and 185 Duane St., New York, Makers for over *One Hundred Years* of the celebrated "*W. Butcher*" Files and Edge Tools and "*Wade & Butcher*" Razors, and the Original Manufacturers of Hollow Ground Razors, can with confidence highly recommend their goods and particularly their

WADE & BUTCHER  
SHEFFIELD, ENGLAND

OR



OR



FOR SALE BY ALL DEALERS IN HARDWARE, CUTLERY AND FANCY GOODS.

### The Richardson Tack Hammer.



This is a perfectly balanced Hammer with Claw of peculiar construction. When tacks driven closely to base-board are to be removed they can be extracted quickly and without injury to wood-work. They are made in two grades, No. 1 and No. 0. No. 1 grade has a magnetized head, making it unexcelled for ceiling work or for use in places where only one hand can be used to advantage. No. 0 grade is finished in same manner as No. 1, but is not magnetized. We earnestly solicit a trial of this Hammer, and would ask that you write to our nearest agent for prices. Manufactured by

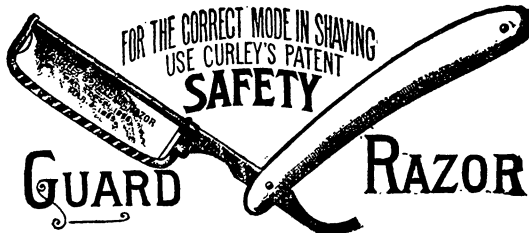
SMETHPORT MACHINE COMPANY, Limited,  
SMETHPORT, PA.C. H. GURNEY CO., Western Agents, Chicago, Ill.  
A. FIELD & CO., New York City Agents.  
BUEHLER, BONBRIGHT & CO., Agents, Philadelphia, Pa.

## JOHN LOYD,

Machine Knives, Shear Blades,  
Presses and Dies.

Nos. 558 to 562 Water Street, New York.

The Practical Polish and Varnish Maker.  
By H. C. STANDAGE. A treatise containing 750 receipts and formulae for the manufacture of varnishes, polishes, &c. 12mo, cloth.....\$2.50  
For Sale by David Williams 96-102 Reade St., N. Y.



We also carry the largest line in the United States of CUTLERY of every description.

**J. CURLEY & BROTHER,**  
6 WARREN STREET, - - NEW YORK.

### ADJUSTABLE CARPENTERS' CLAMP.



MANUFACTURERS OF

Bench Stops, Standard Clamps, Adjustable Clamps, Carpenters' Clamps, Band Setters,  
Adjustable Hollow Augers, Twist Drill Bits for metal, Twist Drill Bits for wood.

THE CINCINNATI TOOL CO., 281 Broadway, Cincinnati, Ohio, U. S. A.



Angular Borer.

### Backus Patent Bit Braces,

RATCHET BRACES, ANGULAR BORERS,

Adjustable Socket Wrenches and Breast Drills.

Write for 1892 Catalogue and Price List.

**BACKUS MANUFACTURING CO.**

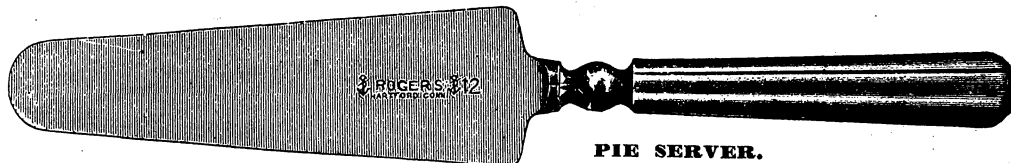
WILLIAMSPORT, PA

Adjustable  
Socket Wrench.

— **NONE BETTER** —  
 THAN THE



# SILVER PLATED WARE.



PIE SERVER.

MANUFACTURED BY

## THE Wm. ROGERS MFG. Co.,

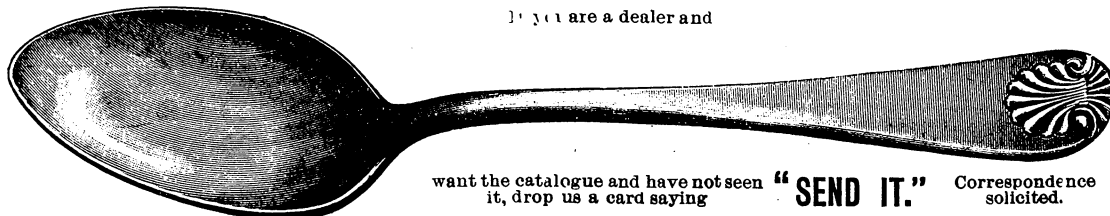
Office and Factory, HARTFORD, CONN. P. O. Drawer 30.

NEW CATALOGUE FOR THE ASKING.

## WHY DID YOU SEND FOR IT?

That new catalogue with illustrations of our Silver Plated Flat Ware. Was it of service to you? Did you order a line of our spoons and forks in consequence? **WHY NOT?**

If you are a dealer and



want the catalogue and have not seen it, drop us a card saying **"SEND IT."** Correspondence solicited.

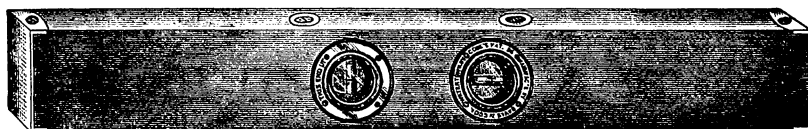
THE HOLMES & EDWARDS SILVER CO.,

Bridgeport, Conn.

IF YOU WANT THE BEST  
 FOR CATALOGUE & PRICES.  
 THEIR MAKE IS EQUAL  
 IF NOT SUPERIOR  
 TO ANY OTHER.  
 HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST  
 FOR CATALOGUE & PRICES.  
 THEIR MAKE IS EQUAL  
 IF NOT SUPERIOR  
 TO ANY OTHER.  
 HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST  
 FOR CATALOGUE & PRICES.  
 THEIR MAKE IS EQUAL  
 IF NOT SUPERIOR  
 TO ANY OTHER.  
 HAVE BEEN IN BUSINESS SINCE 1840.



## COOK'S PATENT LEVEL.

Made in Wood and Iron. Every Level Fully Guaranteed.

Inquire at your nearest hardware store for them. If not in stock, send to

TAKE NO OTHER.

**DAVIS & COOK,**  
 WATERTOWN, N. Y.

## Detroit Cork-Screw Co., Detroit, Mich., U. S. A.

Manufacturers of

The Davis Cork-Screw,  
 The Davis Knife and Cork-Screw,  
 The Puddefoot Cork-Screw,  
 Columbus and Greely  
 Cork Extractors.

Manufacturers of

Cut Worm  
 Spiral Screws and  
 Cork-Screw Novelties.  
 Cut Worm Cork-Screws  
 for the Bar Cork Puller



Fig. 3. Showing cork screw and fulcrum in position to pull cork.

Send for Price-List and Discounts.

GENUINE **MARTY** RAT AND MOUSE TRAPS  
 ALWAYS IN STOCK.



**THEY DO THE WORK.**  
 Orders solicited. Prices on application.  
**BURDITT & WILLIAMS,**  
 20 Dock Square, Boston, Mass.  
 — SOLE AGENTS AND IMPORTERS. —

SELLS AT SIGHT.



Wanted by  
 Every Housekeeper.

## Cottner's Pat. Dipper and Cup Handle.

Is the handiest thing out. With it a dipper can be made of a common glass, a tea cup, or a granite ware cup. The glass or cup can be securely attached to the handle or removed in a moment. The handle is very durable, and so cheap that they will sell at sight. For sale by all jobbers. Price \$7.20 per gross. If your jobber cannot supply you, send orders direct to

**HOME NOVELTY MFG. CO.,** St. Louis, Mo.  
 Hatch Cutlery Co., 97 Chambers St., New York, Eastern Agts.

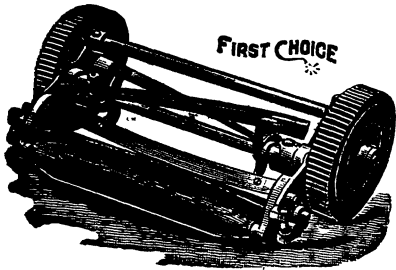
# SURPLESS, DUNN & ALDER.

— INCORPORATED, —

Nos. 97 Chambers and 79 Reade Streets, New York.

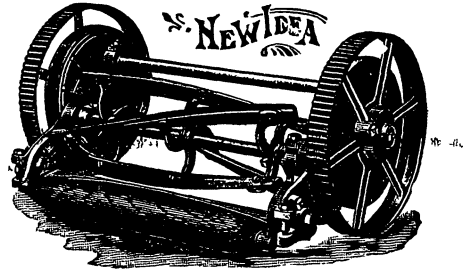
*Representing only Leading American Hardware Manufacturers.*

## LAWN MOWERS.



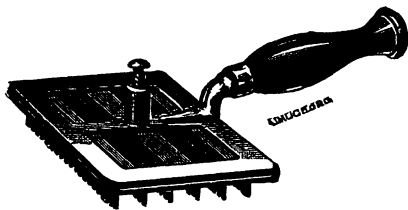
Both our Low and High Wheel Mowers have the right and left hand adjusting screw. Reel shaft runs in box, where all wear can be taken up.

Every machine guaranteed.



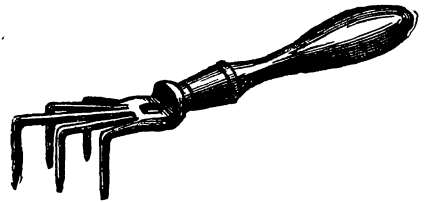
A full line of Boys' Garden Sets, Floral Sets Kitchen Hardware and Hardware for Children's Carriages.

Sole makers of the celebrated "Maud S." Self-Cleaning Curry Comb.



**B. B. NOYES & CO.,**

Greenfield, Mass.



Send for full Catalogue and Prices.



outs, Kennel Chains, &c.; also cut to lengths for manufacturers' use.

The cut represents the exact size of 6/O.

Thirteen Sizes made, 6/O being the Largest.

**The Bridgeport Chain Co.'s Triumph**

Chain, made into Halters Traces, Cow Ties, Tie-

FACTORY AT

BRIDGEPORT, CONN.



**FAYETTE R. PLUMB,**

Edge Tools, Railroad, Hammers, Miners' Sledges. B.S. Tools.

MAIN OFFICE AND WORKS:

Penna. R. R., Tucker and James Sts., - - Philadelphia, Pa., U. S. A.

## "OUR DESIRE IS TO PLEASE ALL,"

but it is a very difficult task. SOME OF OUR FRIENDS say our "ads." DO US AN INJUSTICE, as we, having a first-class line of goods, should be MORE DIGNIFIED in our methods of advertising. We will try. WE DESIRE TO PRESENT to your notice our line of braces, consisting of 19 DIFFERENT STYLES OR NUMBERS, several of which are made in sizes ranging from "6 to 14 inches," others "8 to 14 inches" and lowest grades, "8 to 12 inches."

Since WE OBTAINED possession of this plant, we have PERFECTED ALL parts which were defective. Broadened the wearing surfaces, strengthened the ratchets, INSERTED STEEL where formerly malleable iron, and now can furnish you with an entire line of braces, which we will guarantee very much superior to those produced by our predecessors and equal in every respect to any braces in the market.

We assure you, we will appreciate your orders. We will furnish you with goods of such satisfactory quality, give your commands such prompt attention and treat you with such business courtesy, that you will feel warranted in continually extending the line of our braces which you now carry. As it is possible you may not have our latest price-list, we will be greatly pleased to mail same on application. If you have never handled our wares, we will thank you for a sample order, or favor us with your address, that we may instruct our representative to call on you with samples. We take this opportunity to THANK OUR FRIENDS for their liberal patronage and will spare no effort to merit the confidence reposed in us.

124-126 Washington Street, Buffalo, N. Y

THE BRACE & TOOL CO.

**A. S. HENN & CO.,**

Manufacturers of

Hardware Specialties, Can Openers, Pocket Wrenches, Mincing Knives, Clothes Line Pulleys, &c.

Send for Catalogue.

NEW HAVEN, CONN.



DRIVE IT

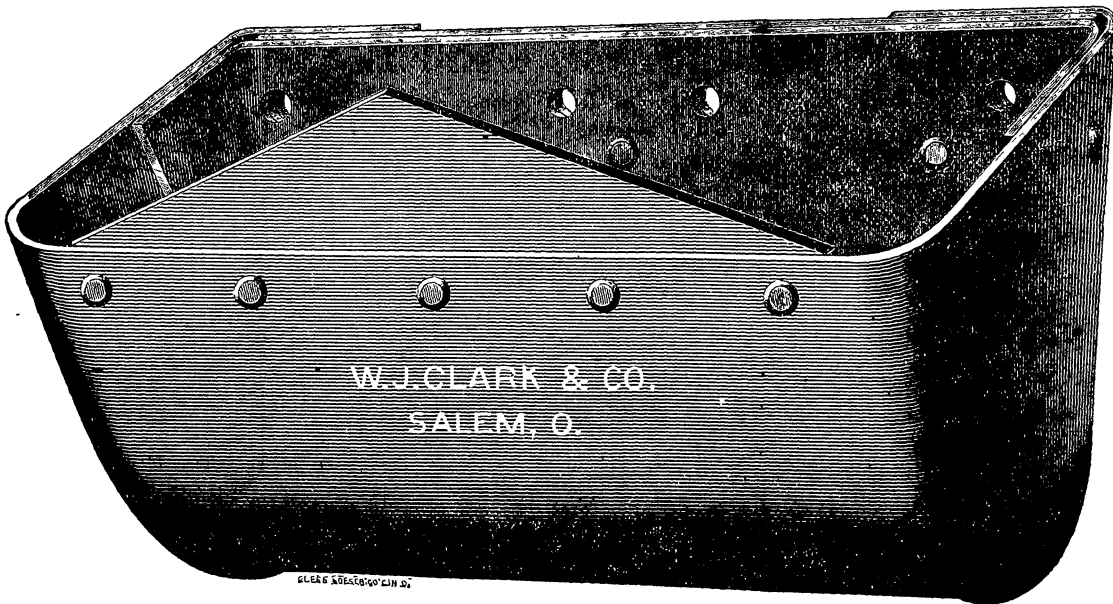
**HOME**



Instantly—the screw, we mean, with the **HOWARD-ALLARD SCREW DRIVER**. Original Patent Spiral Clutch Triple Bit. Quality High, Price Moderate. Two Sizes, each packed in a durable box, and filled with Three Sizes Bits. You press forward on Handle, the Spiral turns the Screw. Get the Original "ALLARD" from your Jobber, or write us for Circular and Prices.

SOLE AGENTS THE ALFORD & BERKELEY CO., 75 Chambers St., NEW YORK.

Milling, Mining, and Grain Elevating  
Buckets always in stock. Any size.



Elevating and Conveying Apparatus  
a Specialty.

Extra heavy "SALEM" elevator buckets with **DIGGERS** to enable them to load themselves when used for loading cars with dirt, sand, gravel, &c. We make them of any size and of any Strength required.  
**W. J. CLARK & CO.,** General Sheet and Plate Metal Workers, **SALEM, OHIO, U. S. A.**  
Send specifications for estimates on any special work wanted.

Warranted Better than the Best

## ENGLISH ANVIL

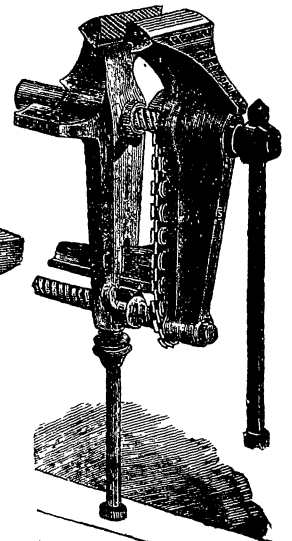
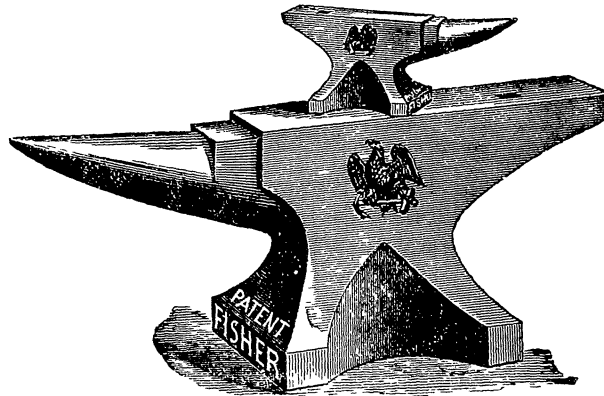
Face in one piece of **BEST TOOL CAST STEEL, PERFECTLY WELDED**, perfectly true, of hardest temper, and never to come off or "settle." Horn of tough *unt tempered* steel, never to break or bend. Only Anvil made in United States fully warranted as above.

## FISHER DOUBLE-SCREW VISE

IS FULLY WARRANTED STRONGER THAN ANY OTHER LEG VISE, AND ALWAYS PARALLEL. Is the best Vise for Machine Shops and Blacksmiths, and for all heavy work. **ACCURATE AND DURABLE.** Send for Circular.

ESTABLISHED 1843.  
MORE THAN 200 DIFFERENT PATTERNS.

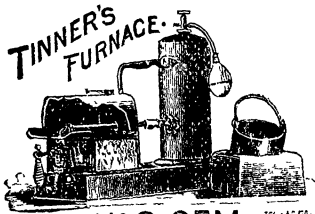
None Genuine without our Trade-Mark,  
**EAGLE and "FISHER" Stamp.**



**EAGLE ANVIL WORKS.** - **Trenton, N. J.**

Sold in New York by our agents, **J. C. McCarty & Co., 97 Chambers St., The Russell & Erwin Mfg. Co., 45 Chambers St.**

## Burgess Gem Gasoline Furnaces,



No 3 GEM

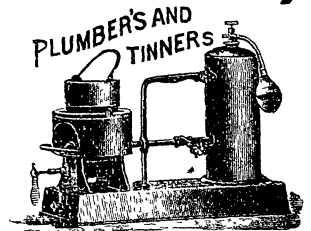
ALL ARE EQUIPPED WITH THE CYLINDRICAL BURNER.  
Price each, Tin Reservoir, \$7.00. Plumbers' Hood for No. 3, 50 cents.  
Copper " 8 50. " Pot for No. 3 or 4, 50 cents.  
No. 3 guaranteed to work out of doors or on roofs in all kinds of weather  
No 4 will melt 12 lbs. of lead in 8 minutes, and will heat the coppers and melt lead at the same time.

For Sale by all First-Class Jobbers, or Send to us for Descriptive Circulars.

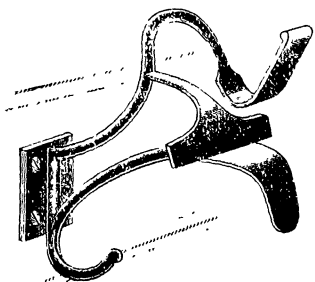
**Burgess Soldering Furnace Co.,**

**J. BURGESS & SONS, Props. and Mfrs.**

**COLUMBUS, O.**



No 4 GEM



## Murrin's Hat Rest

—AND—  
COAT HOOK COMBINED.

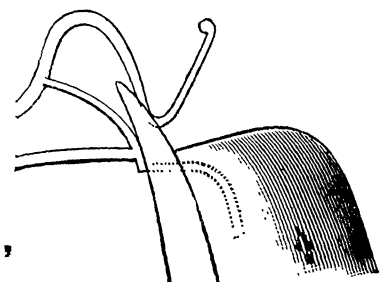
Can't Swing.  
Never Tumbles.  
Always Steady.

**PATENTED.**

FOR SALE BY ALL DEALERS OR BY

**THE MURRIN HAT REST CO.,**

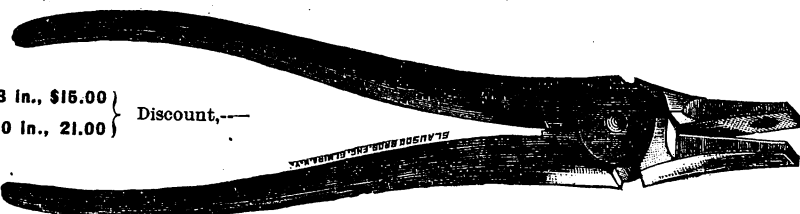
1515 S. Jefferson Ave., ST. LOUIS, MO.



K

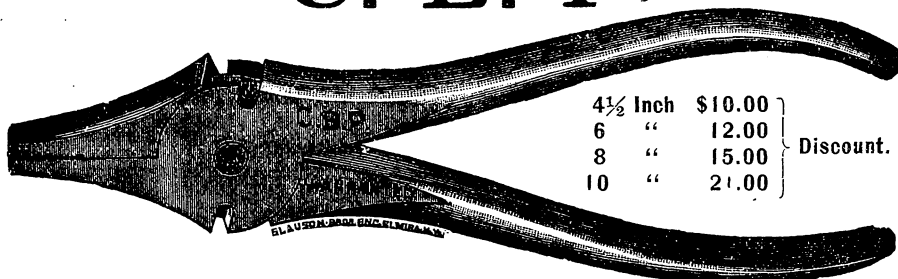
# Cronk's Patent Wire Cutter AND Bender.

8 in., \$15.00 }  
10 in., 21.00 } Discount,---



This surpasses any Plier in the market for Cutting and Bending Wire, and can also be used in place of Hill's Hog Ringer. Is especially adapted to farmers' use in building Wire Fence, &c. Our reasons for claiming that we have the best Pliers in the market are:  
FIRST.—We use the best Tool Steel and they are nicely finished.  
SECOND.—We combine both Flat and Round-Nosed Pliers in one; the concave and convex circles between the handles are used for bending wire in any desired shape.  
THIRD.—The cupping in the Nose is used for pulling tacks, brads or nails, and can also be used in place of Hill's Hog Ringer.  
FOURTH.—We can cut Barbed Wire, Barb Belt or any kind of Wire used for Fencing purposes. We also claim that we have the only Plier made that the Cutting Jaws cannot be broken. By passing the Wire through the Pliers it makes a very handy cut and also holds the Wire after it is cut.

**C. B. P.**



4½ Inch \$10.00 }  
6 " 12.00 } Discount.  
8 " 15.00 }  
10 " 21.00 }

What we claim for this plier is that it is made from best quality tool steel and is made heavier and stronger than any plier of its kind in the market and the finish is first-class. Also they are made so the jaws are parallel when used on wire from 9 to 14 gauge and will hold the wire solid.

**CRONK HANGER CO. Sole Manufacturers, Elmira, N. Y.**

Pacific Coast Agents: CHAS. L. PIERCE & CO., San Francisco, Cal.

## Hand Screws

Hand Screw Spindles made of strictly second growth Hickory—never anything else.

## Case and Glue Clamps

All threads cut with a saw to leave the grain solid—a patent process.

## Cabinet Makers Benches

Nearly 700 of our Benches used by Grand Rapids Furniture makers alone.

WRITE FOR CATALOGUE.

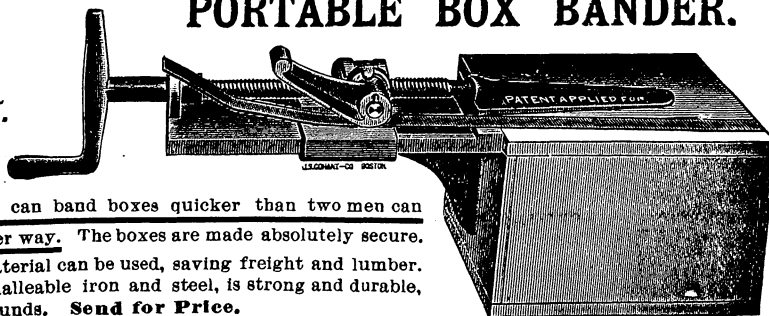
**Grand Rapids Hand Screw Co.**

GRAND RAPIDS, MICH.

CHICAGO AGENTS, BRITTAN & BOND, 154 LAKE STREET.

SOON  
PAYS  
FOR  
ITSELF.

## PORTABLE BOX BANDER.



One man can band boxes quicker than two men can in any other way. The boxes are made absolutely secure. Lighter material can be used, saving freight and lumber. Made of malleable iron and steel, is strong and durable, weighs 8 pounds. Send for Price.

**GOODELL & HARDING, Manufacturers,**

**BURLINGTON, VT.**

## Dangler

Electric

## Torches

FOR  
GASOLINE  
OR  
OIL

14 JETS OF LIGHT

3 to 6  
INCHES  
LONG.

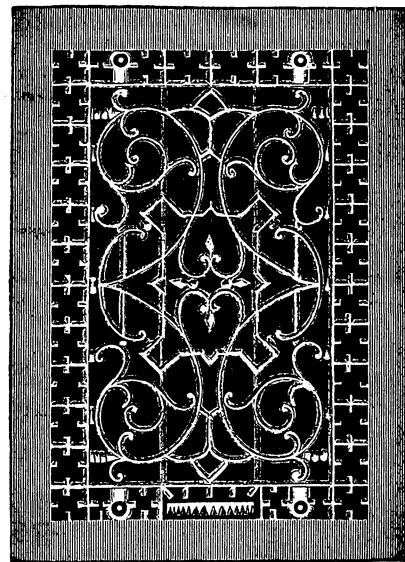


FOR lighting manufacturing establishments, such as Rolling Mills, Foundries, Machine Shops, Engine Rooms, &c., &c., with a convenient, portable brilliant, steady light, and by cheaper means than by Coal Gas.

SOLE MANUFACTURERS,

**The Dangler Stove & Mfg. Co.,**  
Cleveland, Ohio.

# REGISTERS.



Catalogue and Prices on Application.

**Cleveland Foundry Co.,**  
CLEVELAND, OHIO.

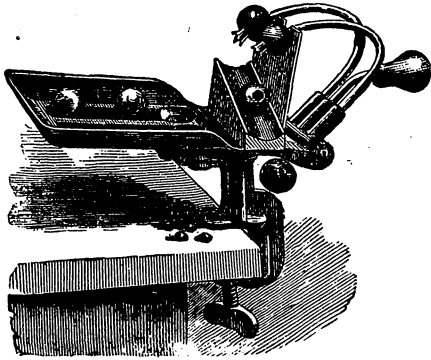
Eastern Office, 82 North St.,  
BOSTON, MASS.

The Prospector's Field-Book and Guide in the Search for and the Easy Determination of Ores and other Useful Minerals. By Prof. H. S. OSBORN, LL.D. EXTRACT FROM THE PREFACE: In the following pages we have attempted to present such a view of the whole subject of prospecting for the useful minerals that any liberally educated reader may fully comprehend our meaning. We have therefore explained special terms where we have thought it convenient to use them, and where the technically educated student would not need an explanation. The table of contents and index have both been carefully prepared, and being very full, will make reference to any subject in the volume easy and satisfactory. 44 engravings. 175 pages \$1.50

For Sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.



# THE FAMILY CHERRY STONER.



The best Machine ever invented for stoning cherries.

The *only Machine* that does not mash the fruit and waste the juice.

No other machine will fill its place.

Stock in New York, Philadelphia, Cincinnati, Indianapolis, Chicago and St. Louis, from which orders can be shipped promptly.

**GOODELL COMPANY,**  
Sole Manufacturers, **Antrim, N. H.**

## ACME CUTTING TOOLS.

Made in all Sizes.

**SOLID STEEL ACME PLIER  
AND WIRE CUTTER.**  
Made with cutters of best steel.



**ACME CUTTING NIPPER.**  
Jaws of Choicest Tool Steel, dovetailed into the head, making it as strong as solid steel.



**HIGGANUM HARDWARE CO., HIGGANUM, CONN.**  
New York Office, 18 Cliff Street.



## Law without Lawyers.

A Compendium of Business  
and Domestic Law for  
Popular Use.

By **H. B. COREY,**  
Member of the New York Bar.

PRICE, \$1.00. Post-paid.

A simple, clear and accurate presentation of the general laws, and of the laws of the several States relating to the rights of property, contracts, debts, partnerships, bankruptcy, insurance, corporations, marriage, divorce, &c., &c., with which are included correct copies of all legal instruments and forms, such as notes, deeds, mortgages, leases, wills, &c., and a dictionary of legal words and phrases.

SENT PREPAID ON RECEIPT OF PRICE BY

**DAVID WILLIAMS, Publisher & Bookseller**

26-102 Reade St., New York

## TRIVERS BROS. CO.,

— MANUFACTURERS OF —

**PURE MANILA AND SISAL  
ROPE.**

**MANILA, SISAL AND MIXED  
BINDER TWINE.**

Mexican Hammocks, Hammock Attachments, Peerless Sash Cords, Hardware Twines, Agts. Silver Lake Sash Cords.

Office, 107 Duane St.

16 Thomas St., N. Y.

## LIGHT YOUR DARK SHOPS CHEAPLY.

Give your men plenty of Light and they will do double work.

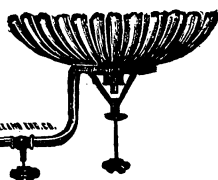


The Wall Torch has been used for several years as a means of illumination in Mills, Foundries, Machine and Car Shops, Tunnels, Street Stands, Band Stands, Smith Shops, etc.

While there are many cheap, inferior torches made which injure the sale of a good article, and condemn the Torch in general, our "Incandescent" Wall Torches are recognized as the best, and are now in use in the largest manufacturing establishments in the country giving **PERFECT SATISFACTION**, as is evidenced by the **DUPLICATE ORDERS** we receive from year to year.

They burn 150° Coal Oil, or 74° Naphtha, requiring a different burner for each.

In ordering be careful to state which is desired.



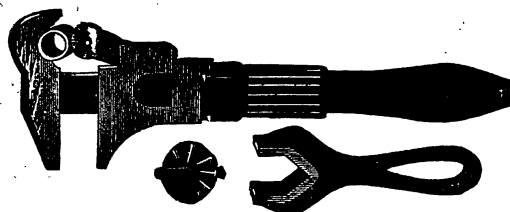
Price, for Single Torch, complete, \$2 each.

SPECIAL PRICE QUOTED FOR QUANTITIES.

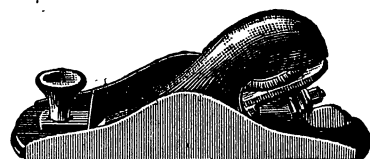
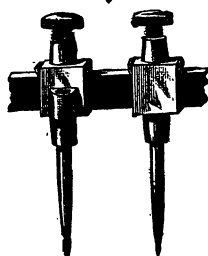
**THE STANDARD LIGHTING CO.,**

100 to 118 Perkins Ave., - - - Cleveland, Ohio,

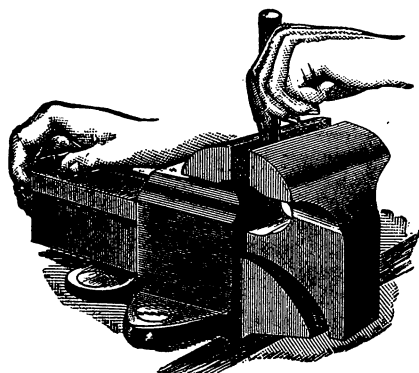
# HIGH QUALITY TOOLS



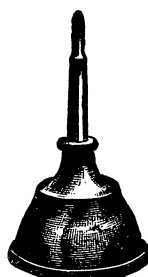
Donohue's Pat. Engineers' Wrenches,  
Short or Long Sleeve Nuts, and  
with Pipe Cutter.



Chaplin's Patent Iron Planes,  
Corrugated Bottoms,  
Checked Rubber  
Handles.



Stephens' Patent Vises, Quick Adjust-  
ing Cam and Toggle-Joint, Sta-  
tionary or Swivel Base.



Challenge Iron Planes.  
Simplicity of Construction.

Boardman's Pat. Wrenches, Excelsior Expansion Bits, Whitney Drills, Baxter's Wrenches,  
Wood's Pat. Plumb and Levels, Devoe's Square Attachments, Gem Wrenches,  
Malleable Oilers and Lamps, Pencil Attachments.

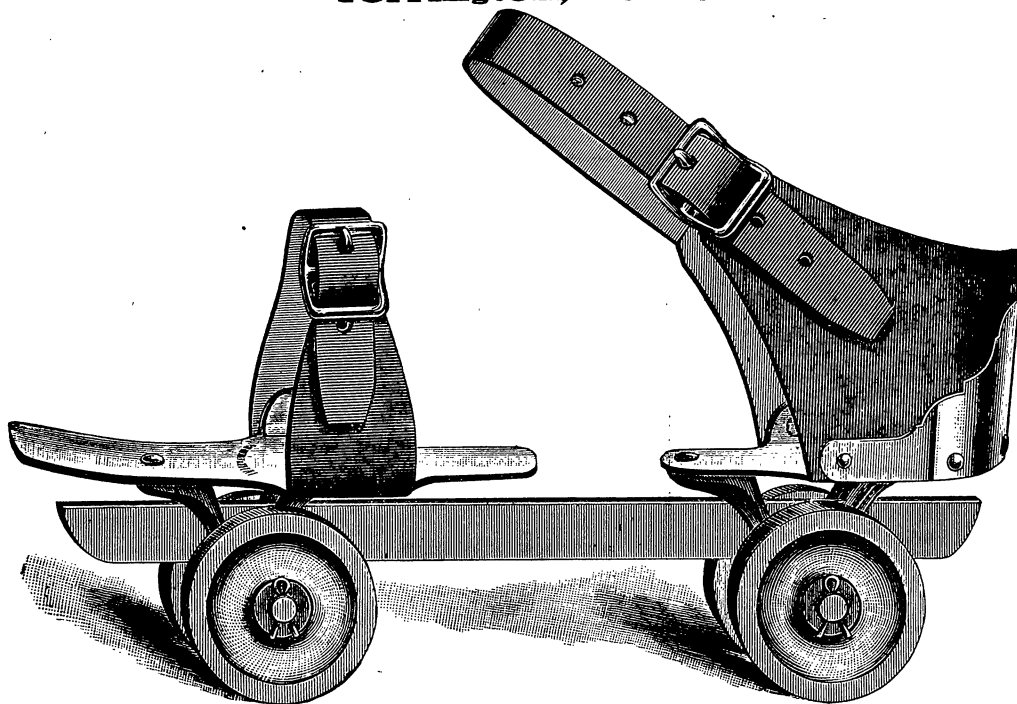
**TOWER & LYON, Manufacturers, - - 95 Chambers St., New York.**

**SIDEWALK AND RINK ROLLER SKATES OF ALL KINDS.**

—:MADE BY:—

**THE UNION HARDWARE CO.,**

Torrington, Conn.



The above illustrates our new Extension Skate, one size fitting all shoes from 8 to 11 inches. We also have it in full clamp and in both plain and nickel finishes.

—NEW YORK OFFICE:—

**TOWER & LYON, - - - - 95 Chambers Street.**

# THE IMPROVED PROCESS GLUE CO.,



Purchasers of the Glue Business of The Le Page Co.

Gloucester, Mass.

New York City.

JOHN J. TOWER, of Tower & Lyon,  
New York, President.

C. E. HUBBARD, Boston  
Treasurer.



The Improved Process Glue Co., having purchased from The Le Page Co., all its patent rights, formulas, glue stock and material, and having secured control of its glue factory, machinery, etc., will continue the manufacture of Liquid Fish Glues in all the various grades heretofore offered by The Le Page Co., under the personal supervision of Mr. Wm. N. LE PAGE, and under the Improved Process Patent issued October 26th, 1886. As is well known, the Improved Process by which these goods are made assures the highest strength with thorough uniformity as to quality, consistency and color. We call special attention to our Improved Process Family Glues, neatly put up for family use, and also to our Improved Process Carriage Glue for wood-work, put up in every variety of size and style. This Carriage Glue is undoubtedly the strongest and best glue for every variety of cabinet and wood-work, and has earned its high reputation. All our canned glues are put up with the new patent cap or fastening, patented January 22d, 1889, which has proved a great convenience and success. Our glues will be readily identified by our characteristic Blue Label, and the Trade-Mark shown at the head of this page. Send for Price-List. Messrs. TOWER & LYON will have charge of our New York office. Very truly yours,

THE IMPROVED PROCESS GLUE CO., New York Office, 95 Chambers St.

## THE THOMPSON UNIVERSAL



Patented.

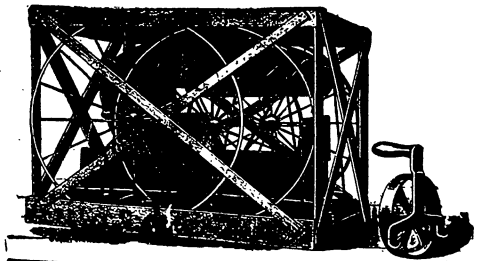
## TRUCK.

One pair will  
Carry 4000 pounds.

Fits any size Crate or Box,  
open or tight.

THOMPSON MANUFACTURING CO.,

D. N. WEAVER, Secretary, - Elkhart, Ind.



**THE GWINNER MANUFACTURING CO.**  
HAMILTON, OHIO, U.S.A.  
PATENTED SPECIALTIES.

YANKEE WRENCH. ADJUSTABLE STOVE TRUCK. HERCULES TRUCK. HERCULES CASTER.

CATALOGUE FREE

## THE BUCKEYE MFG. CO.,

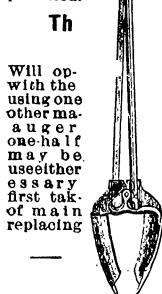
UNION CITY,  
INDIANA.

### The Gem Post Hole Digger.

This AUGER bores rapidly and is easily operated. It will open wide when dumping the dirt, which may be entirely removed from the hole—whether wet or dry, fine or coarse—by closing the blades.

The GEM is the only post hole auger having blades so shaped as to allow them to close in a perfect manner at points, and sufficiently to retain the dryest and even the finest dirt or sand. This great improvement and point of

superior post hole of recent patented.



### Boss 2-speed Boring Machine.

operate a two-inch auger same effort required in and one-half inch in any chine, and for the small have a speed two and times faster. Two augers kept in the machine, to of which it is only need to point it down ward by ing the gear frame out frame inverting and it.



### Lightning Drain Cleaner.

The Drain Cleaner is a hand machine used as a shovel. The dirt pan is made of No. 18 Steel 3 inches deep and 12 inches long, with vertical end in rear. It has a decided advantage over other machines in lipping water and dirt. It is also used for letting down tilting in ditches, which

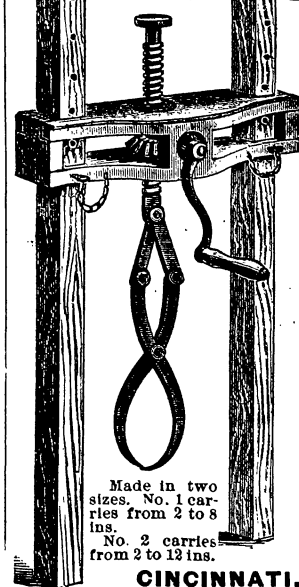
is very convenient and saves extra labor of standing and working in muddy ditches. The iron adjusting rod can be used with great rapidity and ease and can be adjusted to pull or push with as quick a motion as may be desired. To use it in any particular shape tighten the set screw.

Send  
for  
Prices.

## THE CLARK MFG. CO.,

Blind Hinges, Gate Hinges, Door Butts,  
And other HARDWARE SPECIALTIES,  
BUFFALO N. Y.

## COLUMBIAN JOIST LEVELER



For rapidly adjusting and leveling joists, beams, girders, etc.; any size; will not slip nor turn; remains upright at all times; is light, strong and cheap; saves its cost in first building used. Ask your jobber for it or write for circular and price.

THE  
Columbian  
Mfg. Co.

CINCINNATI, OHIO.

Agents Wanted.

No more Slamming!  
...Doors!

Our Combination

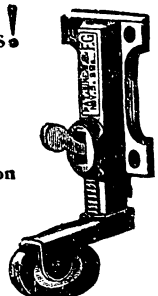
Door Check  
Lock and  
Bumpers

Holds  
door  
in  
any  
position

For sale by all Jobbers. Write  
for Circulars.

Unity Door Check Co.,

81 Dearborn St., Chicago, Ill.



# DAME, STODDARD & KENDALL,

DIRECT IMPORTERS OF

GEO. WOSTENHOLM & SON'S Pocket Knives, Razors, Erasers,  
Farriers' Knives.

WADE & BUTCHER'S Razors.

JONATHAN CROOKES & SON'S Pocket Knives.

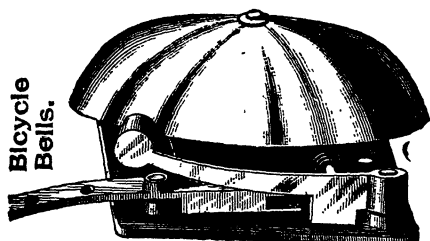
JAS. CHESTERMAN & CO.'S Tape Measures.

GERMAN Pocket Knives, Scissors, Razors.

SOLE SELLING AGENTS IN THE UNITED STATES FOR

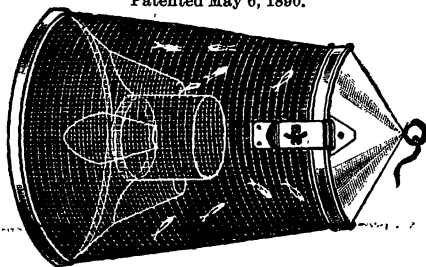
## ENGSTRÖM'S CELEBRATED SWEDISH KNIVES AND RAZORS.

374 Washington Street, Boston, Mass.



Sleigh Bells, House, Tea, Hand, Gong Bells, &c.

Patented May 6, 1890.



### LITTLE DAISY MINNOW TRAP.

A sure thing for good, live minnows. Will last a lifetime. Price, single trap, \$3.50. Liberal discount to the trade.

Illinois State Fish Commission, }  
Office of S. P. Bartlett, Sec'y. }  
QUINCY, ILL., Jan. 19, 1892. }  
Messrs. Cochennour & Wilson, Olney, Ill.  
After two years' use of your "Little Daisy Minnow Trap" I find that it does its work well and satisfactorily. It is a source of great gratification to me to have fresh, lively minnows when I want them, and these your trap furnished me. I can cheerfully recommend it to anglers as a valuable addition to their outfit.  
Yours respectfully,  
S. P. BARTLETT, Sec'y Ill. State Fish Com.  
ED. C. WILSON, Exclusive Manufacturer  
OLNEY, ILL.

### CHAS. DAVIES & CO.,

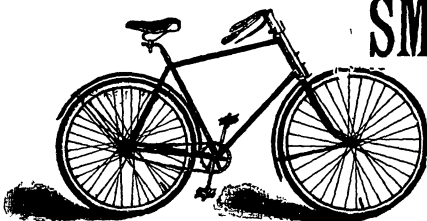
MANUFACTURERS OF  
**LADDERS,**  
Extension and Single. Fire, Railroad and Painters' Ladders.

**LAWN SWINGS,**  
Window Jacks and Swing Scaffolds. Trade discount 20 and 5% list. We pay the freight. Catalogue Furnished.  
329 to 335 West 3d St., Williamsport, Pa.

## Underhill, Clinch & Co.,

94 Chambers St., New York.

O. Ames & Sons, Shovels, Spades and Scoops,  
Chadborn & Coldwell Mfg. Co.'s Lawn Mowers.  
Utica Tool Co.'s Hoes and Rakes.  
Sheble & Klemm's Manure and Hay Forks.  
David Wadsworth's Scythes.  
English Riveted Scythes and Grass Hooks.  
Malleable Iron Rakes, Wooden Rakes,  
Scythe Snaths, Scythe Stones,  
Poultry Netting, Green Wire Cloth,  
&c., &c., &c.



ROAD RACER.

RACINE HARDWARE MFG. CO., (makers of the celebrated Racine Boats), RACINE, WIS., agents for Wisconsin and all territory west of the Mississippi River.

## SMALLEY BICYCLES.

Four Styles, LIGHT ROADSTER, (with mud guards and brake); ROAD RACER, TRACK RACER, (new style handle bars); LADIES' WHEEL, strictly high grade, DISCOUNTS RIGHT. GOOD AGENTS wanted in every town in the United States. Write us for catalogue and we will interest you. Please mention this paper.

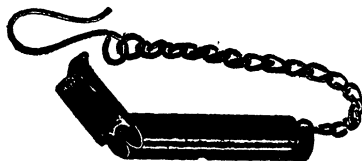
### MARBLE CYCLE MFG. CO.,

Factory, - - PLYMOUTH, IND.

RETAIL DEPOT, 271 WABASH AVE., CHICAGO, ILL.

—:THE UNIVERSAL WHISTLE LEADS THEM ALL.:—

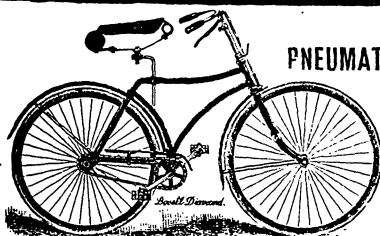
The tone of this whistle is more familiar to the ears of the public than any other made for Bicycles and therefore is invaluable to riders in avoiding accident.



Each whistle has a chain with hook for buttonhole. Sample sent for 25 cents. Send for our list of sundries. Sold by all bicycle and hardware dealers.

THE BRIDGEPORT GUN IMPLEMENT CO., 313 and 315 BROADWAY, NEW YORK

# Lovell Diamond Cycles



**HIGHEST GRADE.**  
PNEUMATIC, CUSHION AND SOLID TIRES.  
FOR LADIES AND GENTLEMEN.  
MANUFACTURED BY  
**John P. Lovell Arms Co.**  
BOSTON, MASS.  
CYCLE CATALOGUE FREE.

## Turn your Brains Into Money.

YOU CAN DO IT  
BY TAKING AN AGENCY FOR  
**The St Nicholas Line of Bicycles.**

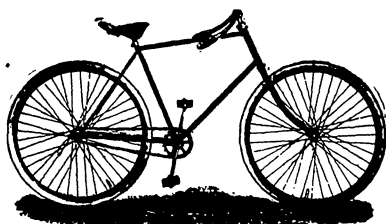
The most Popular and Satisfactory medium grade line of Bicycles in this country. They give no trouble and are thoroughly guaranteed. Fitted with the new Bidwell Constrictive Pneumatic Tire for '93. They are high grade in everything except price. Write to us, we are the sole Eastern Agents, waiting to answer your questions and to quote you liberal discounts.

**GEO. R. BIDWELL CYCLE CO.,**

308-310 West 59th St., N. Y.

**WESTERN WHEEL WORKS.**

**BICYCLE**



**MANF'TRS**

From \$20

to \$135.

**MOST COMPLETE LINE MADE.**

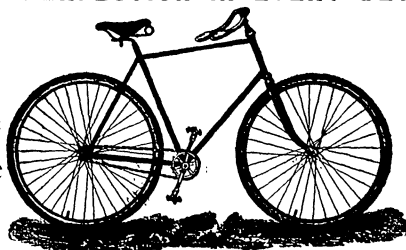
OFFICE AND FACTORY:

Wells, Schiller and Sigel Sts., and N. Park Ave., Chicago, Ill., U.S.A.

**MONARCH BICYCLES**  
ARE PERFECTION IN EVERY DETAIL.

**FOUR STYLES.**

Some makes  
are older, but none  
better.



POPULAR WEIGHTS,

ELEGANT DESIGNS

AND

BEAUTIFUL FINISH.

You can handle **MONARCHES** to advantage in your business. 1893 Catalogue now ready. Send for it.

**MONARCH CYCLE CO.,** 42, 44, 46, 48, 50 and 52 N. Halsted St.  
**CHICAGO.**

## Yacht and Boat Hardware.

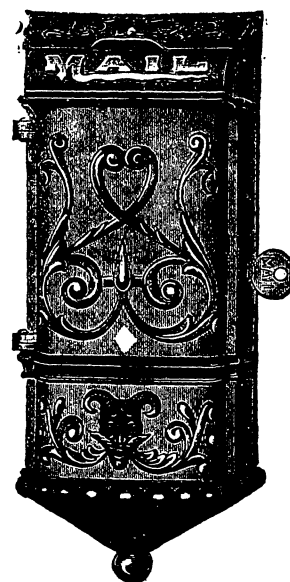
**L. W. FERDINAND & CO..**  
BOSTON, MASS.

**The HENRY C. HART MFG. CO.,**  
DETROIT MICH.

MANUFACTURERS OF

## Hardware Specialties.

Send for Catalogue and Prices.



Full Line of Mail Boxes.

Reliable Torches are  
what you want.



Made either for Oil or  
Gasoline.



These Torches are particularly adapted for use in Factories, Foundries, Machine Shops, Rolling Mills, Blacksmith Shops, Warehouses, &c. They make a strong white light, are free from smoke and are not affected by wind or rain. They are convenient and portable. These Torches can be run at an expense of about one-half cent to one cent per hour, burning a bright, steady light which is ten times greater than the light of an ordinary gas burner. Write us for prices. A liberal discount given to the trade. Manufactured by  
**THE SCHNEIDER & TRENKAMP CO.,**  
Nos. 479 to 497 Case Ave., Cleveland, Ohio.

The New York Safety Dumb Waiter.

"The Manhattan Dumb Waiter,"

"The Improved Humphrey Hand Elevator."

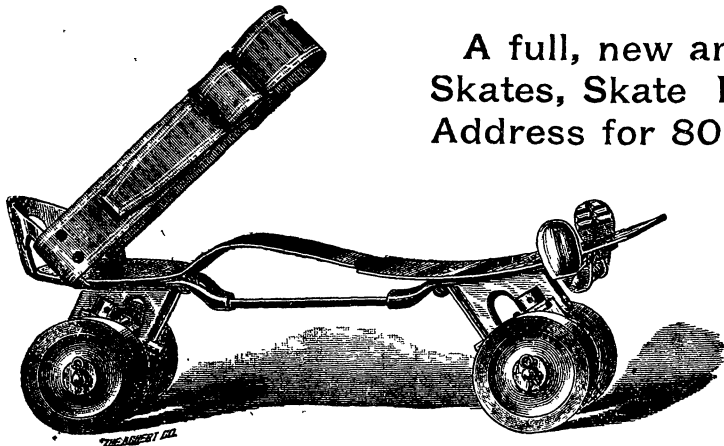
Made specially to be sold by Hardware Stores. Thousands in use. Catalogues on application.

**THE STORM MANUFACTURING CO.**

NEWARK, NEW JERSEY.

Formerly of Poughkeepsie, New York.

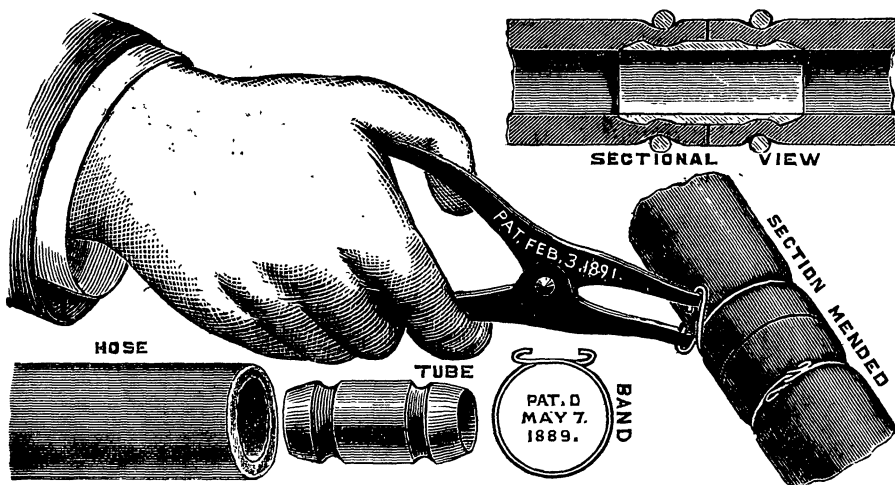
# HENLEY'S CELEBRATED RINK AND CLUB ROLLER SKATES.



A full, new and complete stock of Roller Skates, Skate Repairs and Rink Supplies. Address for 80 page catalogue and prices,

**M. C. Henley,**  
RICHMOND, IND.

## HUDSON'S GARDEN HOSE MENDER.



Put up in Boxes for Family Use.

Each Box Contains 1 Pair Pliers, 6 Tubes, 20 Bands.

Hose can be mended or Couplings fastened on

**CHEAPER,  
QUICKER and  
MORE SECURELY**

than with any other device.

Screw menders tear the rubber lining from the hose. OURS will not. If you wish to handle a good thing with a good profit, write for circular and prices.

**C. E. HUDSON & CO.,**  
LEOMINSTER, - - - MASS.

## STANDARD Spiral Screw Drivers.

Patented July 3, 1888.

**STRONGEST and QUICKEST SCREW DRIVER** in the market. One Tempered Steel Bit furnished with each Driver. **FINELY POLISHED** and **HEAVILY NICKEL PLATED**. Lignum Vitæ Head. **LENGTH OVER ALL, 18 inches.** Each one in a separate wooden box with slide cover.

**Chantrell Tool Company,**  
Reading, Pa.

**JOHN H. GRAHAM & CO.,**  
General Agents,

113 Chambers St., New York

Electric Toy Making, Dynamo Building and Electric-Motor Construction. By T. O'CONOR SLOANE, A.M., E.M., Ph.D. This work treats of the making at home of electrical toys, electrical apparatus, motors, dynamos, and instruments in general and is designed to bring within the reach of young and old the manufacture of genuine and useful electrical appliances. The work is specially designed for amateurs and young folks. Very fully illustrated. \$1.00

For sale by David Williams, 96-102 Reade St., N. Y.

## OUR AMERICAN And Safety Hammer

Double Action in 32, 38 & 44 Cal.

H. & R. Imp. Ejecting Double Action,

H. & R. Imp. Automatic Double Action,  
In 32 and 38 Caliber.

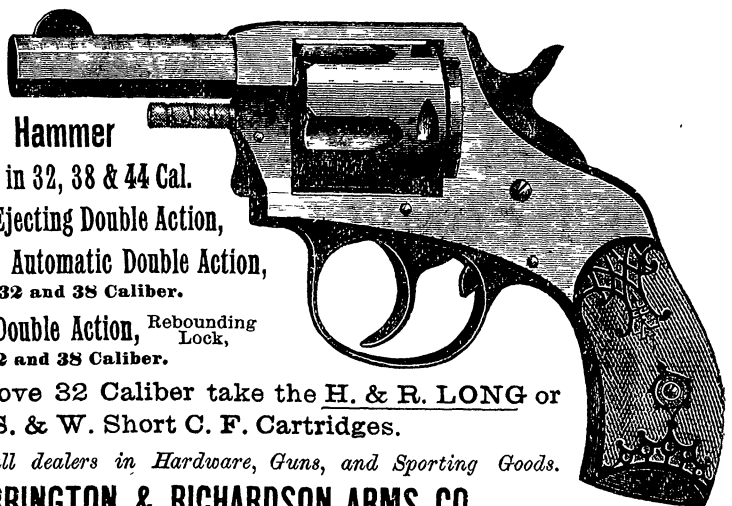
And Premier Double Action, Rebounding Lock,  
In 32 and 38 Caliber.

All the above 32 Caliber take the **H. & R. LONG** or **S. & W. Short C. F. Cartridges.**

For Sale by all dealers in Hardware, Guns, and Sporting Goods.

**HARRINGTON & RICHARDSON ARMS CO.,**

**Worcester, Mass., U. S. A.**



**MONCE'S Novelty Glass Cutters** are the standard. No. 17 just out. Send for Illustrations and Price. We also make the **Compartment Font Interchangeable Lock Stencils** that are having such a run.

**S. G. MONCE** No. 1 All glass men are familiar with this tool. **BRISTOL, CONN.**



This GUN has rebounding locks and the barrels can be taken off and put on again without cocking the arm, and when cocked the hammers may be let down gradually, and without the full force of the blow. It is simple in construction, having very many less pieces than any other hammerless gun.

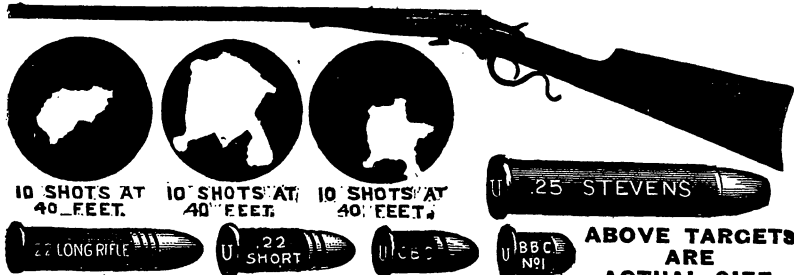
Easily Tipped and Cocked,  
Damascus Barrels,  
Handsomely Engraved,  
Italian Walnut Stock.

SEND FOR DESCRIPTIVE  
CATALOGUE.

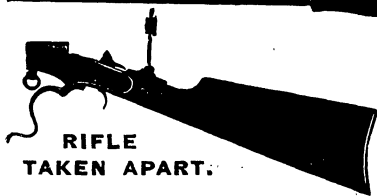


PRICE VERY LOW.

## A Triumph in Small Bore Rifles. STEVENS' "FAVORITE" RIFLE.



Made for the 22 or 25 Rim Fire Cartridge.



RIFLE  
TAKEN APART.

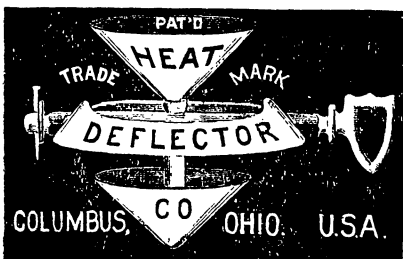
WEIGHT, 4½ POUNDS.  
22-INCH BARREL.  
LEVER ACTION LIKE SHARPS.  
TAKEN APART IN TEN SECONDS.  
IT IS SIMPLY IMPOSSIBLE  
TO MAKE MORE  
ACCURATE SHOOTING BARRELS  
THAN ARE ON THIS RIFLE.

- No. 17. Plain Open Sights.....\$12.50  
No. 18. Vernier, Open Back, and Beach Front Sights..... 17.00  
No. 19. Lyman Peep, Open Back, and Lyman Front Sights, 17.00

A 60 Page Catalog showing our full line of Fire Arms with TRADE PRICE LIST sent with pleasure to all dealers.

**J. Stevens Arms & Tool Co.,**

P. O. Box 5729.  
Chicopee Falls, Mass., U. S. A.



DO YOU WANT  
**MORE HEAT**  
—WITH—  
**LESS COAL?**

This Heat Deflector (easily adjusted in the pipe of your STOVE, RANGE or FURNACE) will do it.

Send diameter (6 or 7 inches)—or circumference—of pipe; state whether you use Hard or Soft Coal or Wood; enclose \$2.50. We will

express one prepaid. After a week's trial if you have followed directions and are not satisfied, we will refund your money on receipt of Deflector, pay express charges and look pleasant.

YOU DON'T KNOW US!  
THESE PEOPLE DO!

And Thousands of Others.

Reference by permission:

J. A. KIGHT, Cashier Farmers' & Mechanics' Bank.

CHAS. G. LORD, Secretary Board of Trade.

**IT SAVES 40% OF FUEL,**

WITH A GOOD DRAFT. LIBERAL DISCOUNT TO THE TRADE.

**BOOKS.** YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and bookseller, 96-102 Reade St., New York.



### To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

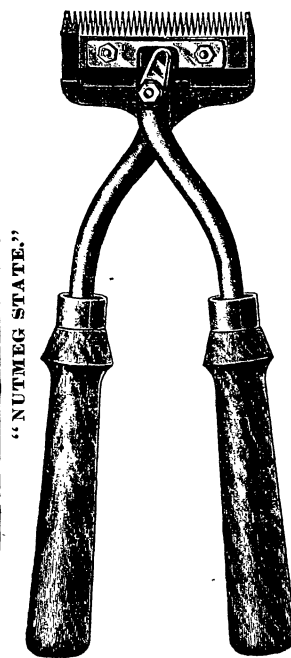
IDEAL MFG. CO., New Haven, Ct., U. S. A.

Please mention The Iron Age when you write.

## Edward S. Hotchkiss,

MANUFACTURER OF HARDWARE,

BRIDGEPORT, CONN



Don't fail to write when in want of Horse and Barber's Clippers, No. 20 Steel Rat Killers, Curry Combs, Metal and Wood Choker Mouse Traps, Lemon Squeezers, Baxter Pattern Wrenches, &c., &c.

**Diamond Cycle Wrench,**  
with Spoke Grip Attachment.



Lightest, Neatest and Strongest.

ALL STEEL DROP FORGED, CASE HARDENED. Weight, 5¼ oz., Length, 4¾", Adjustment, 1¼".

MANUFACTURED BY THE  
**GENDRON IRON WHEEL CO.**  
TOLEDO, O. Sold by all Cycle and Hardware Dealers.

# IMPROVED EDITION OF THE IRON AGE HARDWARE PRICE BOOKS.

Arranged by R. R. WILLIAMS, Hardware Editor of the Iron Age.

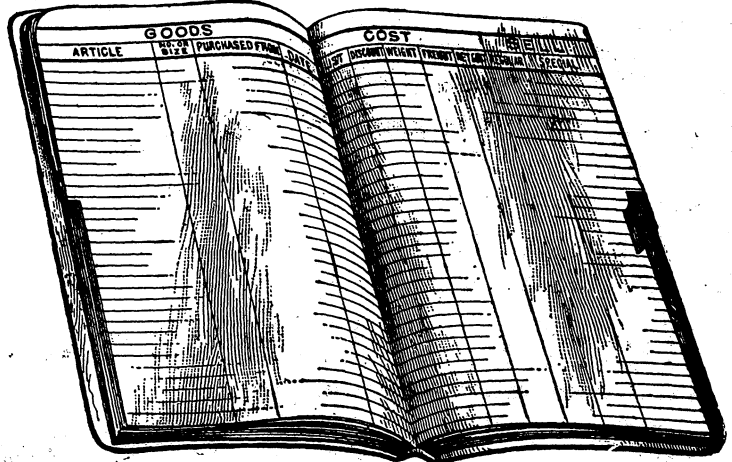
These Books are printed on paper of superior quality and bound in grain seal leather.

Columns are provided for the name and number or size, for noting from whom purchased, date of quotation or purchase, list and discount, and for entering freight expenses as an element of cost. Under the heading of selling prices, the regular and any special price or remarks in regard to the goods are given place. This book goes into considerable detail in describing the goods and cost prices. It has been arranged in accordance with the views of many Hardwaremen whose methods are careful and exact.

Size, 4 x 7 in.; grain seal leather.

#### FOUR EDITIONS:

A, 200 pages,	\$1.00
A F, 200 pages with flap,	1.25
A 2, 400 pages,	1.50
A F 2, 400 pages with flap,	1.75



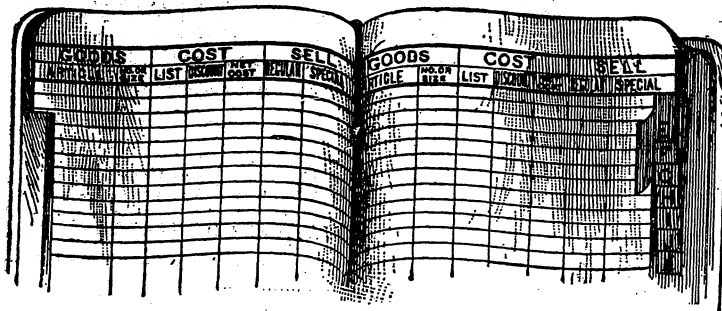
Hardware Price Book A.

In this book each page is complete, and the record of prices does not, as in Book A, run across two pages. Thus it accommodates a larger range of goods with much less detail in the record. It is adapted for office or store use, and by the use of familiar abbreviations, sufficiently large for the convenient and concise record of prices.

Size, 4 x 7 in.; grain seal leather.

#### FOUR EDITIONS:

B, 200 pages	\$1.00
B F, 200 pages with flap,	1.25
B 2, 400 pages,	1.50
B F 2, 400 pages with flap,	1.75



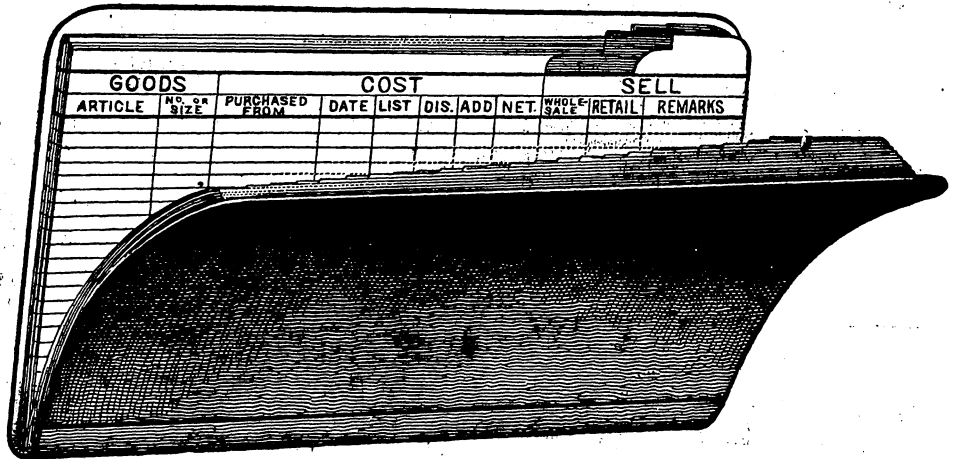
Hardware Price Book B.

The headings in Book C run across the top, in a line parallel with the hinge. In this way a very complete record can be kept on a single page. The details of weight and freight contained in Book A are omitted, and a single column headed "Add" given for the insertion of freight or other expenses which it is desirable to include in the cost. Under the selling prices space is left for the wholesale price, the retail price, and also for any remarks in regard to cost of the goods, desirability of pushing them, or other matters.

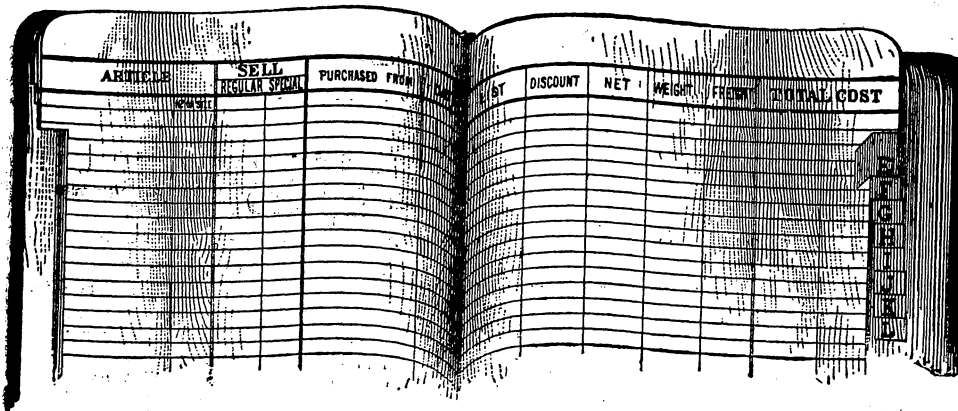
Size, 4 1/2 x 7 1/2 in.; grain seal leather.

#### FOUR EDITIONS.

C, 200 pages,	\$1.00
C F, 200 pages with flap,	1.25
C 2, 400 pages,	1.50
C F 2, 400 pages with flap,	1.75



Hardware Price Book C.



Hardware Price Book D.

arrangement is adapted to the requirements of the trade in this direction.

FOUR EDITIONS.	D, 200 pages,	\$2.00
	D F, 200 pages with flap,	2.50

Size 5 1/4 x 8 in.; grain seal leather.

D 2, 400 pages,	\$3.00
D F 2, 400 pages with flap,	3.50

Price Book D will recommend itself particularly for desk and store use, and for salesmen on the road.

The name of the article, its number or size and the selling price are the first to meet the eye on the left-hand page, as embodying information desired when the selling price is required. The other headings follow in convenient order, by which a detailed memorandum regarding the goods may be kept, the whole being seen at a glance. A number of pages at the back of the book are arranged for memoranda, which will be found a great convenience. This arrangement is adapted to the requirements of the trade in this direction.

Sent, post-paid, on receipt of price by **DAVID WILLIAMS, Publisher, 96-102 Reade St., New York**

# Challenge Iceberg Hardwood Refrigerators,

Manufactured by

## CHALLENGE CORN PLANTER CO.

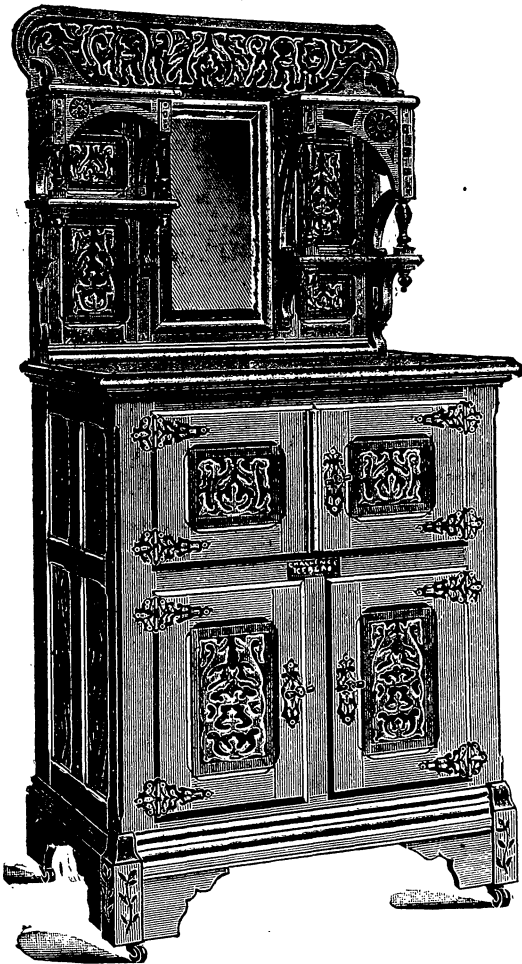
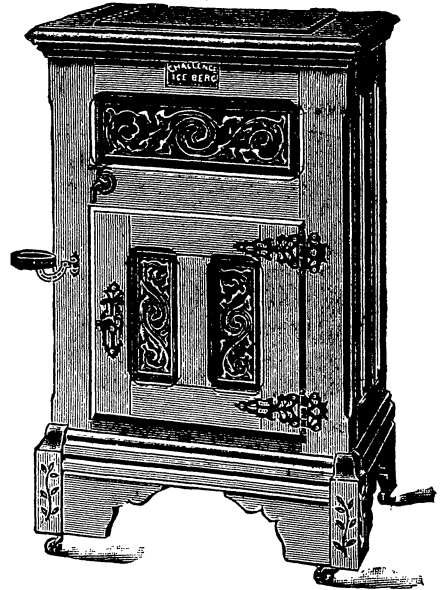
GRAND HAVEN, MICH., U. S. A.

The Largest Factory of its Kind in the World.

Write for prices, and for illustrated seventy-six page catalogue.

### AGENTS:

D. W. Cushing,  
Boston, Mass.  
F. T. Witte Hdw Co.  
New York, N. Y.  
F. M. Borden & Bro.,  
Philadelphia, Pa.  
Simmons Hardware Co.,  
St. Louis, Mo.  
A. Baldwin & Co.,  
New Orleans, La.  
J. Pritzlaff Hdw. Co.,  
Milwaukee, Wis.  
Buhl, Sons & Co.,  
Detroit, Mich.  
Chicago Stamping Co.,  
Chicago, Ills.  
Gurney Refrigerating Co.,  
San Francisco, Cal.



## The Enterprise Manufacturing Co., AKRON, OHIO, U. S. A.

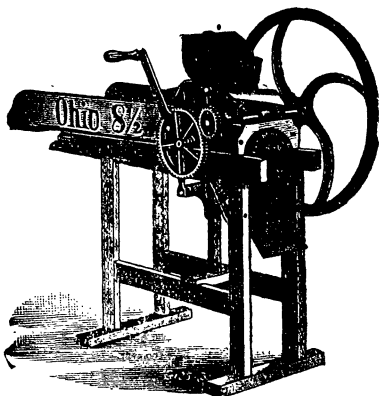
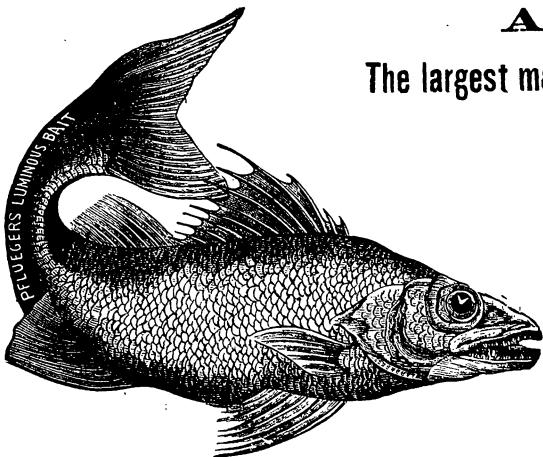
The largest manufacturers of Fishing Baits and Anglers' Specialties in  
the United States.

### EXCLUSIVELY MANUFACTURERS

Trolling Spoons, Spinners, Phantom Minnows, Hard and Soft Rubber Minnows, Frogs, Crawfish, Grasshoppers, Insects, Artificial Flies, Snell Hooks, Furnished Lines, Sinkers, Floats, Fly Cream, Fish Stringers, and many other new goods too numerous to mention.

(With "LUMINOUS BAIT" you catch Fish while with others you might.)

Please mention *The Iron Age*.

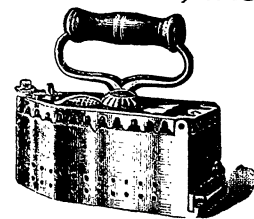


THE "OHIO" Feed and Ensilage  
Cutters and Carriers are the best.

By reason of wide open throat (being full width of cutting surface, all sizes), and improved feeding device, our machines have greater capacity than others.

THE SILVER MFG. CO., Salem, O.  
LINDSAY BROS., - MILWAUKEE, General  
MANLEY & THOMPSON, ST. LOUIS, Agents.

THE  
UNIVERSAL SAD IRON CO.  
MILWAUKEE, WIS.,



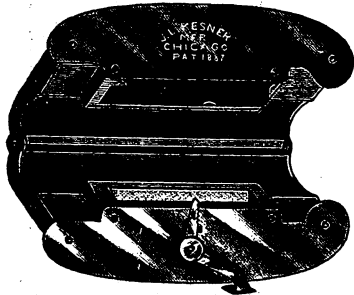
Manufacturers of the Best Charcoal "Sad Iron" in the world for Families, Dress and Cloak Makers and Tailors. Send for Circulars and Sample Irons. Agents wanted everywhere.

# KESNER'S ALWAYS COOL SAD IRON HOLDER.

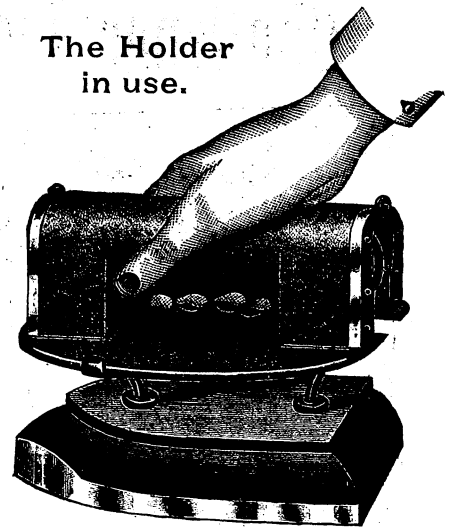
Indispensable to every Housekeeper and Laundry. Sells at sight and pays the Dealer a Large Profit. They pack closely and ship cheaply. Every Holder Guaranteed to give Absolute Satisfaction.

It is the best and only perfect Iron Holder made. It is strong, durable, unburnable, and will fit the handle of any Sad Iron. It never gets hot—**ALWAYS COOL**—instantly applied and self adjustable. Fastens with spring latch and opens with an automatic spring.

It is made on a two part wood frame covered with heavy duck. The inside is lined with asbestos—a positive non-conductor of heat. When closed on the handle of the iron an extra heavy nickel plated brass shield prevents the heat from striking the hand.



Patented Oct. 25th, 1887, and others pending.



The Holder  
in use.

**SOLD BY ALL HARDWARE JOBBERS.**

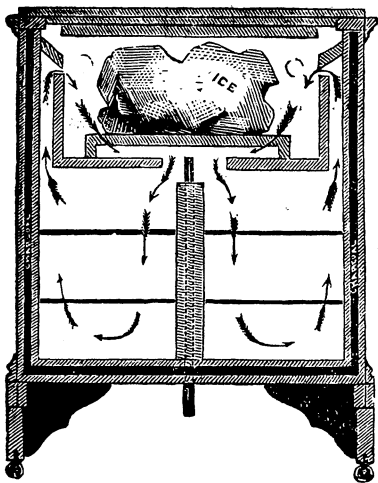
If your jobber does not carry them order a sample gross direct from us. No dealer can afford to be without them.

For Circulars, Testimonials and Price-List write the Manufacturers,

**J. L. KESNER & CO.,**

76-78 E. Illinois Street, CHICAGO, ILL.

## GEORGE N. PIERCE & CO., BUFFALO, N. Y.



MANUFACTURERS OF  
Japanned and Brass Bird Cages  
IN 167 STYLES.

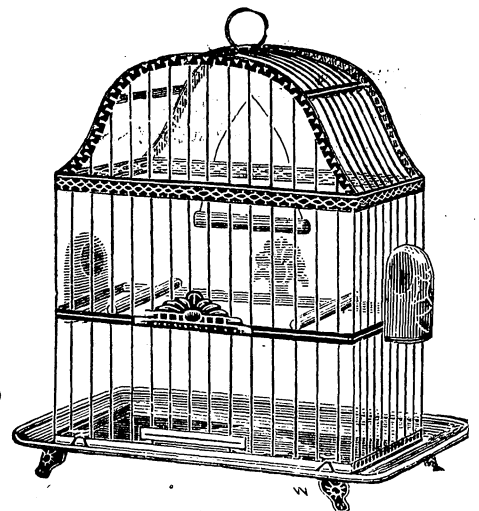
**Hardwood and Grained**

Refrigerators and Ice Chests,

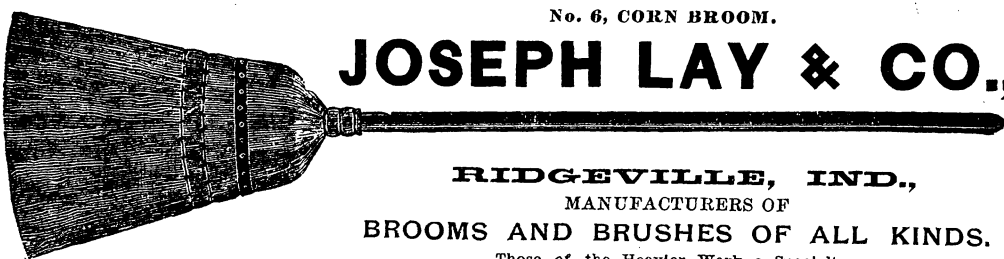
Guaranteed Dry-Air and Perfect Goods, in  
71 Sizes and Patterns. And

**The "Queen" Tricycle,**

in 20 Sizes and Patterns. The one  
Tricycle in this country sold to  
the trade on its MERITS.



Full Illustrated Catalogue and Special Prices Furnished to the Trade on Application.



No. 6, CORN BROOM.

**JOSEPH LAY & CO.,**

**RIDGEVILLE, IND.,**

MANUFACTURERS OF  
BROOMS AND BRUSHES OF ALL KINDS.

Those of the Heavier Work a Specialty.

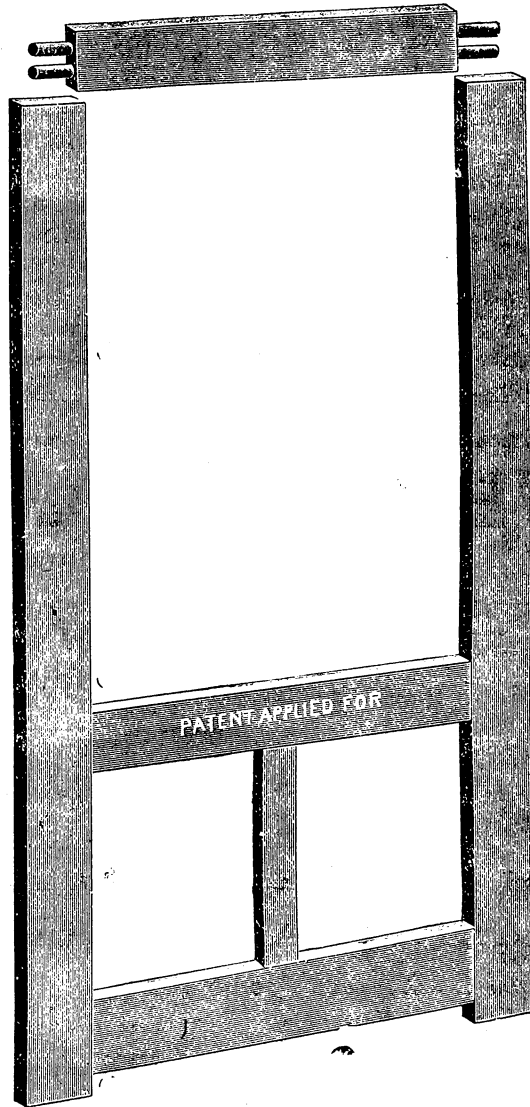
FOR  
RAILROAD, SHOP,  
WAREHOUSE,  
STREET, STABLE,  
BLOOM,  
CHILL, CASTING  
and MOULDERS'  
BRUSHES, &c., &c.]

# Last Call!

If You Have  
Not Yet Or-  
dered  
Ask Them  
for it,

Hibbard, Spencer, Bartlett & Co., Chicago, Ill.  
The McIntosh-Huntington Co., Cleveland, O.  
The Lockwood-Taylor Hdw. Co., Cleveland, O.  
The Stollberg & Clapp Co., Toledo, O.  
F. C. Ballard, Washington C. H., Ohio.  
Smith Bros. Hdw. Co., Columbus, O.  
Wolff, Lane & Co., Pittsburgh, Pa.  
Bindley Hdw. Co., Pittsburgh, Pa.  
Buchler, Bonbright & Co., Philadelphia, Pa.  
Supplee Hdw. Co., Philadelphia, Pa.  
Henry Keidel & Co., Baltimore, Md.  
Kilbourne, Jones & Co., Columbus, O.  
A. F. Shapleigh Hdw. Co., St. Louis, Mo.  
Rector & Wilhelmy, Omaha, Neb.  
Janney, Semple & Co., Minneapolis, Minn.  
Seavey Hdw. Co., Ft. Wayne, Ind.  
Van Camp Hdw. & Iron Co., Indianapolis, Ind.  
The Kruse & Bahlman Co., Cincinnati, O.  
Howell Gano & Co., Cincinnati, O.  
W. B. Belknap & Co., Louisville, Ky.  
Pogue, Miller & Co., Richmond, Ind.  
Emmons, Hawkins & Co., Huntington, W. Va.  
The Geo. Worthington Co., Cleveland, O.  
H. F. Seymour & Co., Rochester, N. Y.  
Babcock & Stowell, Binghamton, N. Y.  
Engle, Kramer & Co., Dayton, O.

Or about it.



## The Kelley Adjustable Screen Door.

FOUR SIZES WILL FIT ANY DOOR, SEE THE POINT?

Any boy can make screen door complete with wire and moulding

**IN FIFTEEN MINUTES.**

The **W. J. Kelley Company,**

(Main Office and Factory),

**Greenville, Ohio, U. S. A.**

Chicago Office, 945 Rookery.

# ENTERPRISE M'FG CO. OF PA.,

THIRD AND DAUPHIN STREETS, PHILADELPHIA.

## ICE SHREDDER,

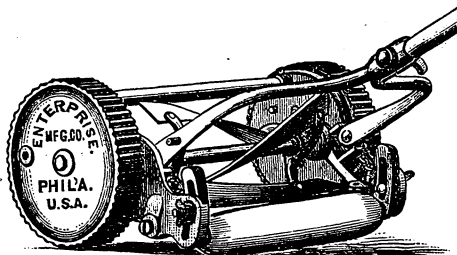
TO SHRED OR SHAVE ICE,  
For Fruits, Drinks, Oysters and  
Clams on the Half Shell,  
Olives, Celery, Radishes,  
Iced Tea, Sliced  
Tomatoes, c.,  
&c. &c.



No. 33, TINNED,   
Price, - - per doz., \$7.20.  
No 34, Nickeled,  
Price, - - per doz., \$24.00.

## LAWN MOWERS,

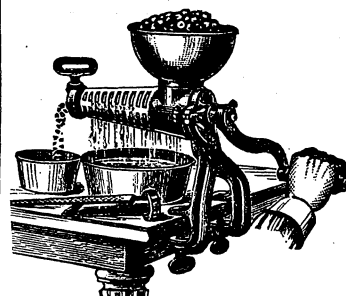
PAINTED or TINNED.



7, 9, 11, 13 and 15 inches.  
Simple in Construction.  
Easily Adjusted.  
Light Running.  
Highly Efficient.  
Durable.

## FRUIT PRESS

FOR MAKING  
Wines, Jellies, Fruit  
Butters, &c.



No. 24, FRUIT PRESS,  
Price, \$3.00.  
No. 28, DRUG PRESS,  
Price, \$4.00.

FOR SALE BY THE HARDWARE TRADE. SEND FOR CATALOGUE.

# WE ARE STILL "IN IT"

— WITH THE —

## EUREKA AND LEADER

Adjustable Window Screens,

— ALSO —

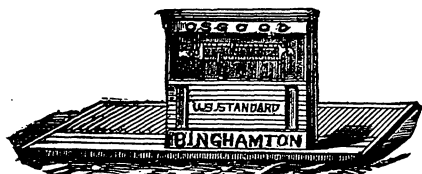
Sticks and Corners for Door and Window Frames.

SEND FOR CIRCULAR AND PRICE-LIST.

## QUEEN ANNE SCREEN CO.,

JNO. H. GRAHAM & CO., Genl. Agents,  
113 Chambers St., New York.

Burlington, Vermont.



— AND —

To the Trade at  
Lowest Prices  
ever known.

Catalogue  
Free.



All goods  
guaranteed  
first-class.

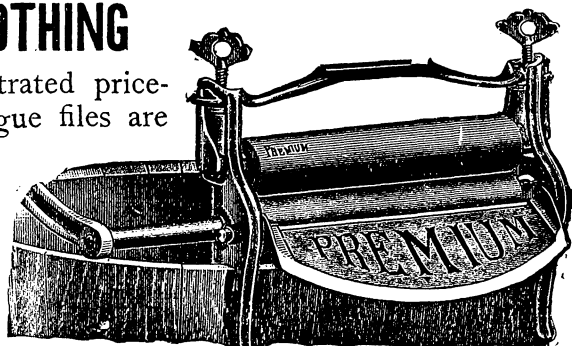
Osgood & Co.  
Binghamton,  
New York.

**Explosives and Their Powers.** By M. BERTHE  
LOT. Translated and condensed from the French  
by C. NAPIER HAKE, Fellow of the Institute of  
Chemistry, Inspector of Explosives to the Govern-  
ment of Victoria, and WILLIAM MACNAB, F.I.C.E.  
With preface by Lieut.-Colonel J. P. CUNDILL R. A.  
H. M. Inspector of Explosives. With illustrations.  
8vo, cloth.....\$9.60

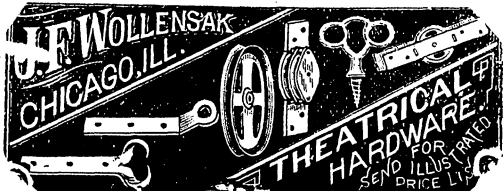
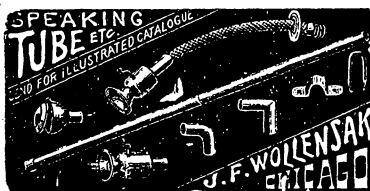
For sale by David Williams, 96-102 Reade St., N. Y.

## IT COSTS NOTHING

to send for our illustrated price-  
list, and your catalogue files are  
incomplete without it.  
Write to the Factory,  
Montpelier, Vt. or to  
our Chicago store,  
68 Lake St.



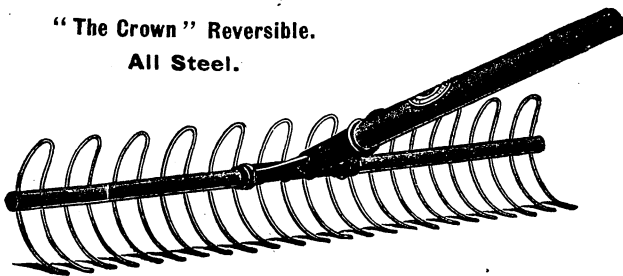
## COLBY WRINGER COMPANY.





# WHEN IN THE MARKET FOR Lawn Rakes and Post Hole Diggers

"The Crown" Reversible.  
All Steel.



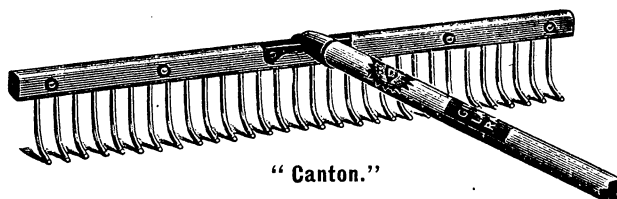
Write for Prices and Catalogue.  
You will find the line we represent the largest, best and most complete made.

HANDLED BY  
**LEADING JOBBERS**  
OF HARDWARE.

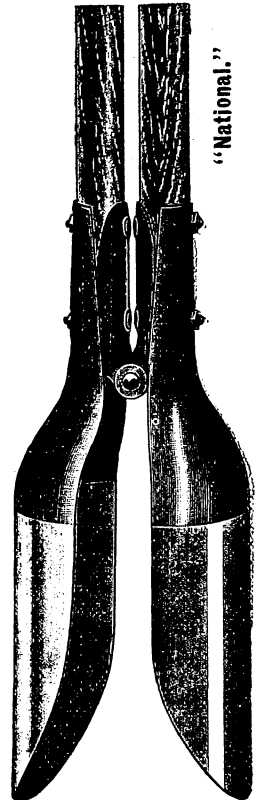
Lawns are cleaned perfectly and quickly with these Rakes, requiring no picking of grass or leaves from the teeth, and do not tear the sod when raking. The teeth cannot come out, get loose nor twist.



**SIX STYLES OF LAWN RAKES:**  
Gibbs. Canton. Crown No. 1. Acme. Crown No. 2. Favorite.



**FOUR STYLES OF DIGGERS:**  
Gibbs. Columbia. National. Imperial.  
Made in the most thorough manner of the best material and warranted.



**JOHN H. GRAHAM & CO., 113 CHAMBERS ST., NEW YORK CITY.**  
**GENERAL AGENTS.**

# PURE ALUMINUM COOKING UTENSILS

**A REVOLUTION IN COOKING UTENSILS.**

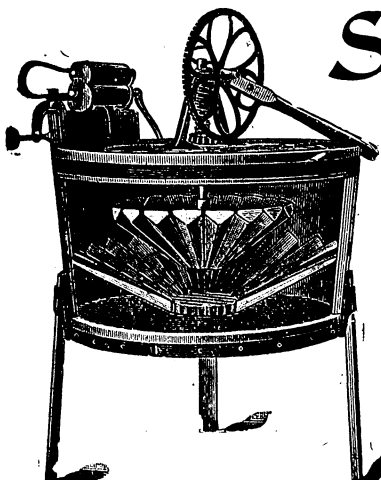
Aluminum utensils do **NOT** Scorch milk, rice, or any farinaceous food.

One 2-Quart Pan, One 4-Quart Pan, One Large Fry Pan, One 13-inch Wash Bowl, Sent to any address for **\$5.00.**

**ALL GAUGES OF ALUMINUM SHEET KEPT IN STOCK.**

Address

**THE ILLINOIS PURE ALUMINUM CO., - Lemont, Ill.**



# Self Praise

**IT IS SAID, IS NO RECOMMENDATION,**

But we cannot refrain from referring to the virtues of

**THE WEISELL WASHER**

continually. They are made to wash dirty clothes easily and without tearing.

Write for sample machine.

**DIETHER & BARROWS,**  
Ft. Wayne, Ind.

**American Stamping Co.,**

Manufacturers of

All Kinds of Tinware and Sheet Metal Goods.

N. Y. Office and Salesroom, 104 & 106 John St.  
Factory, 103 to 119 N. 3d St., Brooklyn, E. D., N. Y.

**1893** **CATALOGUE**  
**JUST OUT**  
HOLLOW WARE and HARD WARE SPECIALTIES.  
**The STUART & PETERSON CO.,**  
PHILADELPHIA, PA., U. S. A.

## "PURITAN"

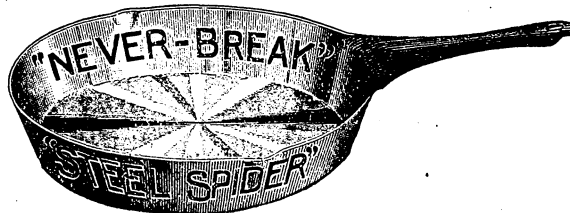
COOKERS, COFFEE POTS AND  
OTHER SPECIALTIES.



Cooks Quicker than any other  
Porcelain Rice Boiler made.

## "NEVER-BREAK"

Wrought Steel Spiders  
Wrought Steel Griddles, Kettles, Stew Pans, Stew Pots, Maslins,  
Scotch Bowls, Hotel Sauce Pans, &c.  
MIRROR POLISHED—TINNED—PORCELAINED.



"MIRROR POLISH," the only Perfect Plain Steel Finish  
SOLE MANUFACTURERS

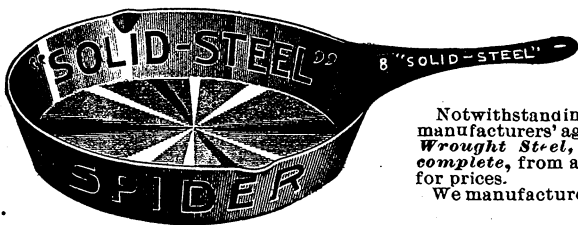
## "EXCELSIOR."

Roasting and Baking Pan.  
PLANISHED and PLAIN STEEL.



THE BRONSON SUPPLY COMPANY,  
CLEVELAND AND NEW YORK.

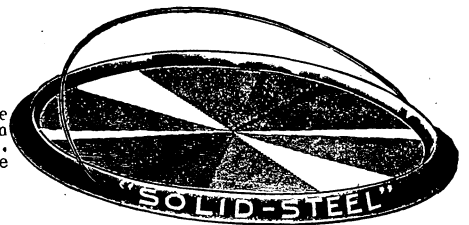
## "SOLID-STEEL" SEAMLESS HOLLOW WARE.



No Seams, no Rivets in "Solid-Steel" Ware.

BRILLIANT FINISH.

Notwithstanding the claims made by some  
manufacturers' agents, our spiders are made from  
Wrought Steel, Without Seams or Rivets,  
complete, from a single piece of metal. Write  
for prices.  
We manufacture our own goods.

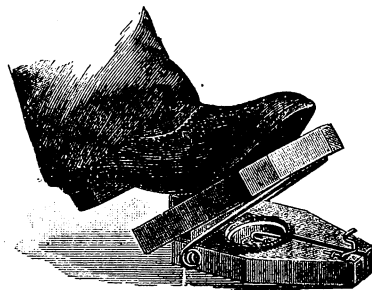
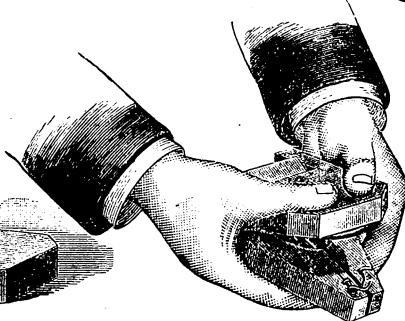
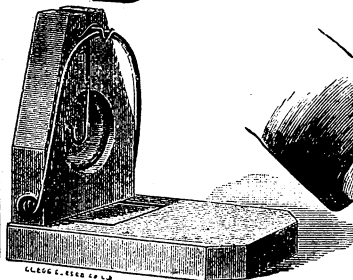


All Sizes Balled.

The Cleveland Stamping & Tool Co., Cleveland, O.

We are in shape to figure on light and heavy stamping, and in addition to the above we build Dies and Stamping Machinery.

## THE "SURPRISE" SELF-SETTING RAT TRAP. PATENTED. BEST AND SIMPLEST TRAP IN THE WORLD.



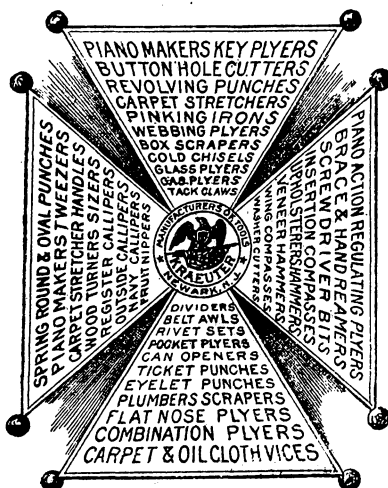
# A Trap For Trade.

AUTOMATICALLY SET WITH THE HANDS OR FOOT.

Catches Dollars for the Seller and Rats for the Buyer.

Don't handle infringements.

The  
SUN MANUFACTURING CO.,  
SUCCESSORS TO  
THE JNO. M. WADDELL MFG. CO.,  
GREENFIELD, O.



## Actual Merit

More of this is to be found in the  
**QUEEN WASHING MACHINES**

than in any other similar construction.  
We should be glad to enumerate its  
good points to intending purchasers.  
Exclusive agencies given dealers  
without charge. Write for prices  
and sample machine.

**BUCKEYE CHURN COMPANY,**  
SIDNEY, OHIO.

# FIRE = = =

Owing to the complete destruction of our establishment by fire on the 5th inst., we shall be delayed a few days in filling orders for our specialties. Temporary quarters have been secured, while rebuilding of plant on the old site is being pushed forward as rapidly as possible, and we hope to be able to ship goods promptly within a week or ten days at most.

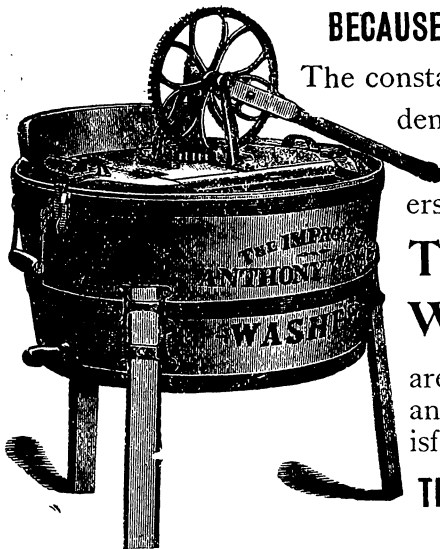
**THE FRED J. MEYERS MFG. CO., Covington, Ky.**

MARCH 6, 1893.

## IT'S THE BEST

**BECAUSE IT IS.**

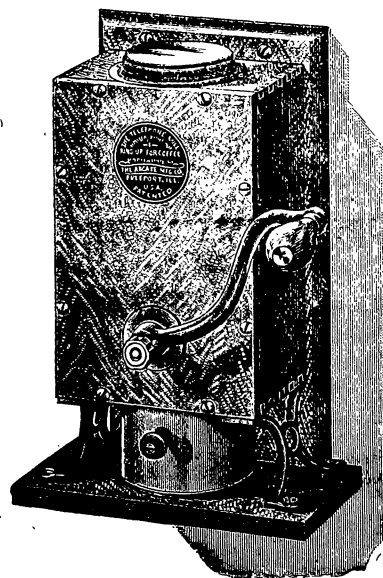
The constant proof of this assertion is evidenced in the words of commendation received from our customers daily.



### The Anthony Wayne Washing Machines

are constructed on practical lines, and hence afford the greatest satisfaction. For particulars address

**THE ANTHONY WAYNE MFG. CO.,  
FORT WAYNE, IND.**



### Arcade Manufacturing Co.

MANUFACTURERS OF THE

### "TELEPHONE"

AND OTHER HIGH-GRADE FAMILY

### COFFEE MILLS.

The "TELEPHONE MILL," for grinding Coffee or Spices, is made of hard wood, highly finished and nickel trimmed. The only boxed mill which can be fastened on table, shelf or wall—holds a pound of coffee—self-feeding, and easily regulated to pulverize.

We also Manufacture the Celebrated

### ARCADE SCREEN DOOR HINGES

And Other Hardware Specialties.

**Send for Prices and Catalogues.  
EAST FREEPORT, ILL.**

NEW YORK AGENTS, J. C. McCarty & Co.,  
97 Chambers St.

## TRANSOM PLATES.



SEND FOR CATALOGUE AND PRICE-LIST.

**Missouri Malleable Iron Co., - East St. Louis, Ills.**

## TUCKER'S PATENT FURNITURE CASTER.

Malleable Iron  
Castings.

**Will  
Not  
Break.**

Round  
Oblong  
Stem  
Plate  
AND  
Combined  
Common  
Drive or  
Fox Stem.

(SEE CUT.)



The most satisfactory Anti-Friction Caster in the market.

—ASK FOR—

Catalogue, Discount and Sample.

**Tucker & Dorsey Mfg. Co.  
INDIANAPOLIS.**



### THE BOSS Washing Mch.

An Entirely New Invention.  
Double acting, working with two cylinders in opposite directions. The greatest saver of household labor ever invented.

**E. H. HUENEFELD,  
CINCINNATI, O.  
Send for Circular.**

Telephones, Their Construction and Fitting. A Practical Treatise on the Fitting Up and Maintenance of Telephones and the Auxiliary Apparatus. By F. C. ALLSOP. 191 pages, cloth...\$2.00  
For sale by DAVID-WILLIAMS, 96-102 Reade st., N.Y.

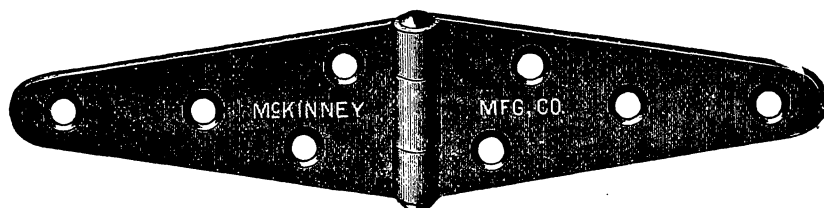
# McKinney Mfg. Co., Allegheny, Penn.

— WE MANUFACTURE —

## STEEL HINGES AND BUTTS

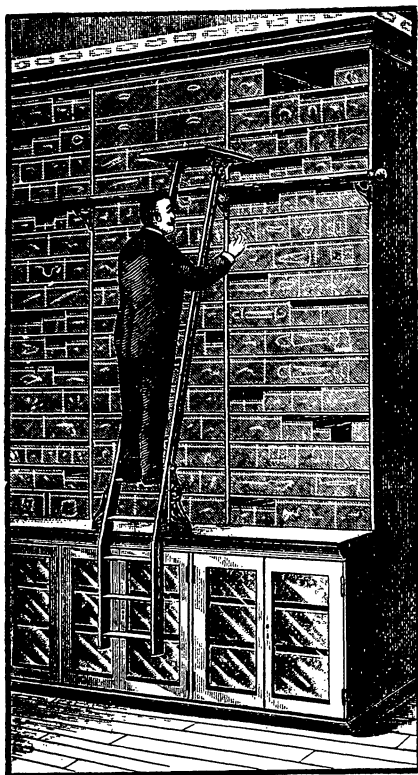
EXCLUSIVELY.

SEND FOR  
LIST.



ORDERS FILLED  
ON SIGHT.

**"NONE BETTER."**



### THE BICYCLE STEP LADDER

The Newest, Neatest, Simplest, Easiest Operated and Safest Store Ladder made.

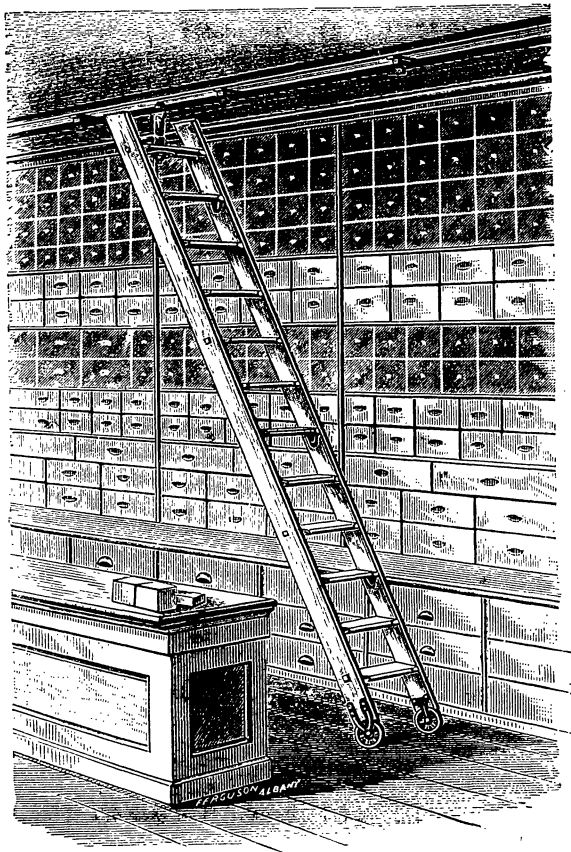
Ladders are not Suspended, but Supported from below on wheels. Move easier with operator on than others when empty. Highly finished, and very hand some. Made in different grades and prices to suit.

Send for illustrated catalogue and prices to

The Bicycle Step Ladder Co.,

184 and 186 Clark St., Chicago, Ill.

### THE "NOISELESS" STORE LADDER.



The latest and best. Perfectly noiseless. Neat in appearance.

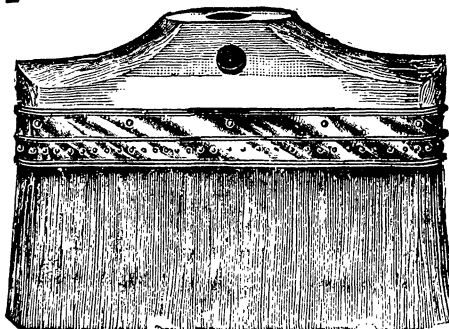
Manufactured by

M. CROISSANT,  
ALBANY, N.Y.



N. Y. Office, 103 Chambers St., W. H. QUINN, Manager

### 7 BRANDS OF Whitewash Brushes.



HORSE, SHOE, WINDOW,  
DUSTING, FACTORY  
AND MACHINE

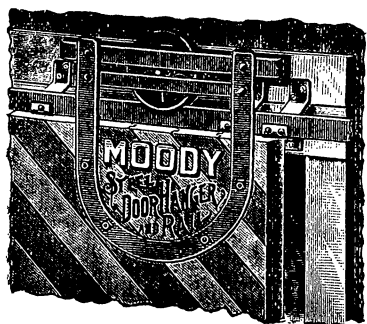
## BRUSHES,

Made especially for the hardware trade. When in need of brushes send for our brush Catalogue.

CINCINNATI MFG. CO.,

211 Walnut St., CINCINNATI, OHIO.

# VICTOR MFG. CO., Newburyport, Mass STEEL RAIL.

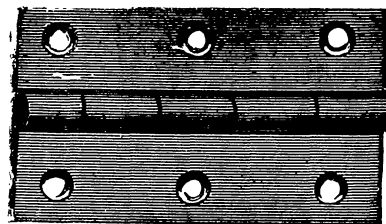


Showing one-half set of hangers attached to door.



The Only Bracing Bracket Made.

PRICE-LIST.		
HANGERS.		Per Doz. prs
No. 5, to run 6 feet, 3 1/4 in. wheel,	-	\$10.00
No. 6, to run 10 feet, 4 1/4 in. wheel,	-	15.00
No. 7, to run 15 feet, 5 1/4 in. wheel,	-	22.00
RAIL, per foot.....		6 1/2 cents.



## Cast Brass Butt Hinges

IN STOCK AND FOR SALE BY

**W. & J. TIEBOUT,**

Nos. 16 & 18 Chambers Street, New York.

MANUFACTURERS OF

**BRASS, GALVANIZED & SHIP CHANDLERY  
HARDWARE.**

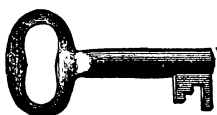
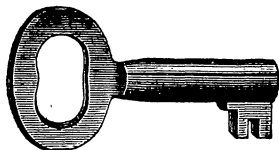
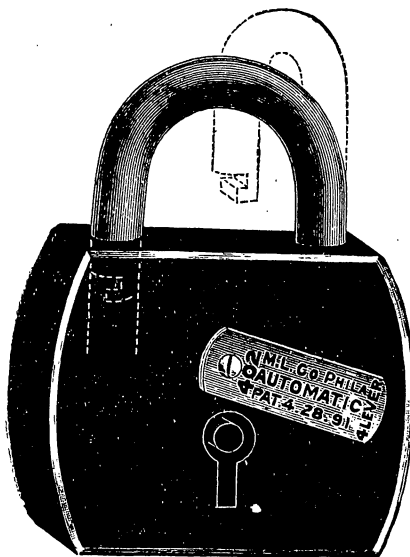
NEW PATENT 4-LEVER

## Automatic Padlock.

Our recommendation of the "AUTOMATIC" Padlock as one that would claim a prominent place in the market has been fully warranted by the universal satisfaction it has given.

We now, with equal emphasis, recommend the smaller size. Every part is well made, of the best materials, and the finish is excellent. These Locks are of a design, weight and size that adapt them to an unusually wide range of service.

The cuts show full size. The larger weighs full 4 ounces; the smaller full 1 ounce. The 4 Levers afford a degree of security unprecedented in locks of such moderate price. Over 200 changes of key are available in the larger, and over 100 in the smaller lock. The automatic action is pleasing, oval and convenient.



When made special, to pass a sample key, also when made with keys alike to pass, and as well when more than 50 changes are required in a set, the price per dozen locks is advanced 50 cents net.

No. 402, Steel, dark finish, 2-keyed,	Per Dozen, \$6.67
" 402B, Brass, bright finish, 2-keyed,	" 8.00
" 400, " Nickel plated, 1-keyed,	" 6.60
" 398, " Bright finish, 1-keyed,	" 6.00

For Sale by Best Jobbing Houses and by all Live Retailers.

**MILLER LOCK CO., Lock Manufacturers, PHILADELPHIA. PA.**

Crown and Giant Sash Cord and Bell Cord. Braided and Twisted Picture Wire Spool Wire, Clothes Lines, Ventilator Cords, Garden Lines, Chalk Lines, Annunciator Wire.

✻ Send for Catalogue, Samples, Prices. ✻

Bright Wire Goods, Picture Nails, Knobs, Chain, Clothes Line Pulleys, etc.

—MANUFACTURED BY—

**OSSAWAN MILLS CO., Norwich, Conn.**

## THE SCIENTIFIC SWEEP MILL

FOR TWO HORSES.

Grinds EAR CORN and SMALL GRAINS.

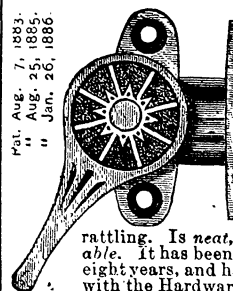
Special Cob Breaking Device and peculiar dress of Grinders. Gives BETTER WORK, MORE OF IT, WITH LESS WORK TO TEAM than others. Send for catalogue of this and

**POWER MILLS.**  
THE FOOS MANUF'G. CO., SPRINGFIELD, OHIO.



FULLY GUARANTEED.  
SENT ON TRIAL.

Pat. Aug. 7, 1883.  
" Aug. 25, 1885.  
" Jan. 26, 1886.

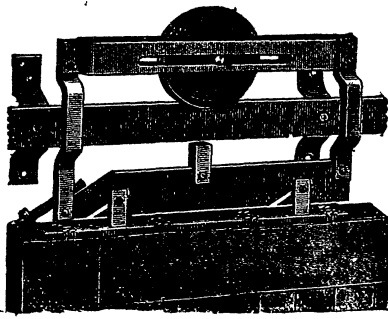


## The Champion SIDE Sash Lock

Has by its unequalled merits gained the public favor. It is a safe ventilator and prevents rattling. Is neat, cheap, simple and durable. It has been in extensive use for over eight years, and has become a staple article with the Hardware trade.

Beware of Worthless Imitations.  
**THE CHAMPION SAFETY LOCK CO.,**  
74 Frankfort St., CLEVELAND, O.





## LANE'S PATENT NOISELESS STEEL PARLOR DOOR HANGER.

This Hanger is made of Steel.  
The Wheel is also Steel, except the filling or tread.  
The Track is of Steel—a single one only.  
The Hanger is Anti-Friction.  
More nearly Noiseless than any other.  
Ease of adjustment.

Can be erected with half the labor others require.  
Track will not swell, shrink or warp out of true.  
No cutting of doors.  
No matching of hardware.  
Simplicity in all its parts.  
Durability.

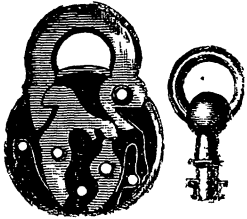
ALSO LANE BARN DOOR HANGER AND TRACK. SEND FOR CIRCULARS.

Manufactured by

**LANE BROS., Poughkeepsie, N. Y.**

**JOHN H. GRAHAM & CO., General Agents, 113 Chambers St., New York.**

## PATENT PERFECTION PADLOCK

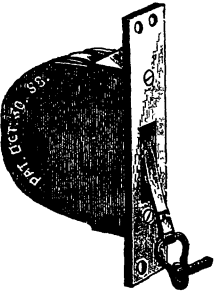


*Eight Tumblers. Key Turning Both Ways.*

Sizes,  $\frac{1}{4}$  inch to  $2\frac{1}{2}$  inches; of cast bronze. Defies competition for quality and price. No steel or iron used, cannot rust, and cannot be picked. Also,  $\frac{1}{4}$  and  $\frac{1}{2}$  inch Padlocks, opened with a common pin, in brass and nickel, for cats and small dogs. The best Railroad Switch and Car Lock in the world. Adopted by the United States Treasury for bonded warehouses.

**AMES SWORD CO., Chicopee, Mass.**

Send for Price Lists and Circulars.



**Merit Always Wins.**

## THE CALDWELL SASH BALANCE

Has been the standard for five years.  
Write for our new catalogue of Hardware Specialties.

**CALDWELL MFG. CO., Rochester, N. Y.**

**READING HARDWARE CO., Agents.**

81 Reade St., New York.  
514 Commerce St., Philadelphia.  
73 Wabash Ave., Chicago.



## Artistic Hardware

—FOR—

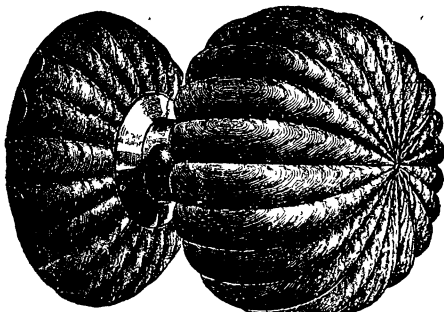
FINE RESIDENCES AND PUBLIC BUILDINGS.

**"VASSAR"**

CYLINDER LOCKS and LATCHES,  
Are the SAFEST in the Market.

**READING HARDWARE CO.,**

NEW YORK, PHILADELPHIA,  
81 READE STREET, 514 COMMERCE STREET,  
CHICAGO,  
73 WABASH AVENUE,  
Factories and Main Office, Reading Pa., U. S. A.



**WOOD DOOR KNOBS,  
DOOR SPRINGS AND CHECKS  
AND CHECKING SPRING HINGES.  
NEW GOODS. NEW PRICES.**

Send for New Price-List.

**J. BARDSLEY, 149 & 151 Baxter St., New York.**

## HARDWARE DEALERS

CAN RECOMMEND THE

## CHAMPION METAL WINDOW SASH CHAINS

to their customers as a reliable substitute for Sash Cords, very strong and lasting (some in daily use ten years), and gives thorough satisfaction wherever used. The patented attachments are very simple and can be applied to any window.

MANUFACTURED ONLY BY

**"THOMAS MORTON"**

65 Elizabeth Street,

Write for Prices.

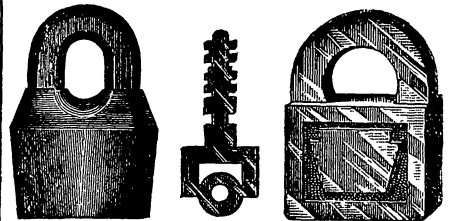
**NEW YORK.**

## KEYSTONE LOCK WORKS,

—Established 1879.—

**E. T. FRAM, Lancaster, Pa., U. S. A.**

MANUFACTURER OF

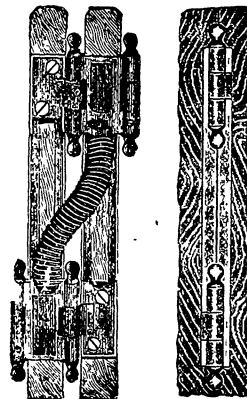


Patent Inter-Locking Tumbler Scandinavian or Jail PADLOCKS, in 56 grades and sizes. Key and Self-Locking. Brass, Bronze, Steel and Malleable Iron. Red, Black, Bower-Barff and Bright Brown finish. Also a full line of fine flat padlocks in Bronze and Steel. All fully described and illustrated in our new catalogue, furnished free to the trade.

**SURPLESS, DUNN & ALDER,**

General Agents, 97 Chambers St., New York.

## Chicago Spring Butts.



MANUFACTURED BY

**Chicago Spring Butt Co.,  
Chicago, Ill.**

DOORS.	1 Jap'd Pair.	21 Nickel Plated Pair.	31 Bronze Plated Pair.	41 Real Bronze Pair.	51 Polished Brass Pair.
$\frac{3}{8}$ to 1 in.	\$1.20	\$3.00	\$4.00	\$5.50	\$8.50
$\frac{1}{2}$ to $\frac{3}{4}$ in.	1.50	3.75	3.75	9.50	9.50
$\frac{3}{4}$ to 1 $\frac{1}{4}$ in.	2.50	5.50	5.50	12.00	12.00
1 $\frac{1}{4}$ to 2 in.	4.00	7.50	7.50	20.00	20.00
2 $\frac{1}{4}$ to 2 $\frac{3}{4}$ in.	7.00	10.00	10.00	30.00	30.00
2 $\frac{3}{4}$ to 3 $\frac{1}{2}$ in.	10.00	14.00	14.00	39.00	39.00

Write for Catalogue  
and Prices.

## SASH WEIGHTS

**E. E. BROWN & CO.,**

McKean and Meadow Sts.,

**PHILADELPHIA PA**

## AMERICAN FOUNDRY PRACTICE

Treating of Loam, Dry Sand and Green Sand Molding, and containing a Practical Treatise upon the Management of Cupolas and the Melting of Iron. By THOMAS D. WELLS. Price, \$2.50. Sent, post-paid, on receipt of price by DAVID WILLIAMS, Publisher and Bookseller 96-102 Reade St., New York.



# AMERICAN CURRY COMB CO.,

TROY, N. Y., U. S. A.

MANUFACTURERS OF ALL KINDS OF

## CURRY COMBS IN STEEL, BRASS AND IRON.

VERY BEST QUALITY AND FINISH.

New York Sales-  
rooms with

FULLER BROS., No. 33 Chambers St.

San Francisco, Cal., Salesroom with

The GEO. F. EBERHARD CO., 23 Davis St.

Portland, Oregon, Salesroom with

The GEO. F. EBERHARD CO., 23 Front St.

*Illustrated Catalogue and Prices to Jobbers on Application.*

All Tags and Labels on Covert Goods bear the above Trade-Mark, and are sold by all Leading Jobbers in General and Saddlery Hardware at Manufacturers' Prices.



## COVERT MFG. CO.,

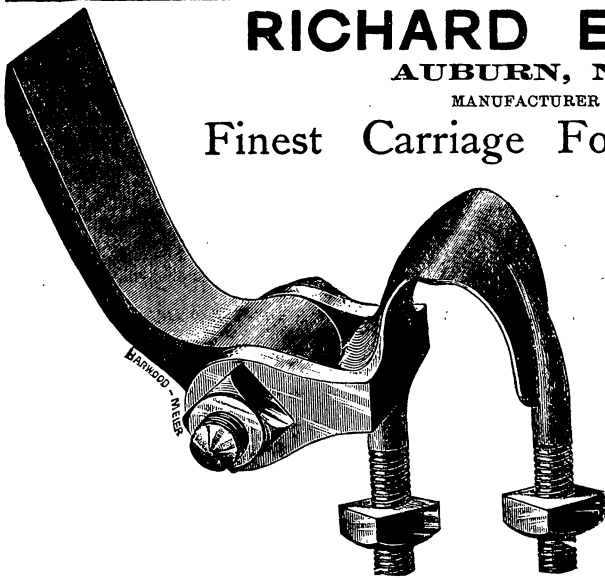
WEST TROY, N. Y.

### RICHARD ECCLES,

AUBURN, N. Y.,

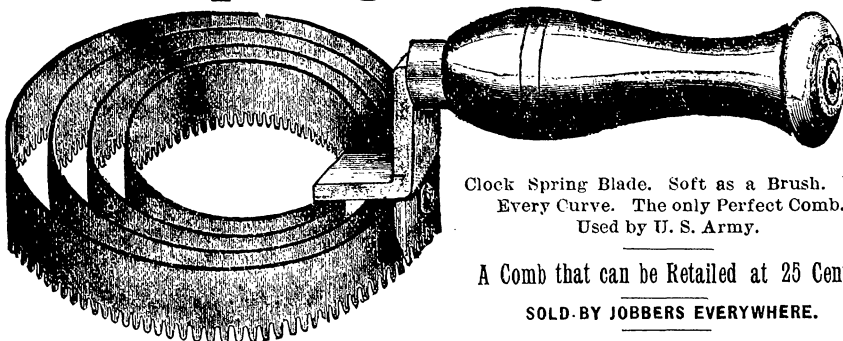
MANUFACTURER OF

Finest Carriage Forgings, Couplings, Clips, King Bolts, Fifth Wheels, &c. Manufacture a full line. Special Drop Forgings.



Send for Catalogue.

## The Spring Curry Comb.



Clock Spring Blade. Soft as a Brush. Fits Every Curve. The only Perfect Comb. Used by U. S. Army.

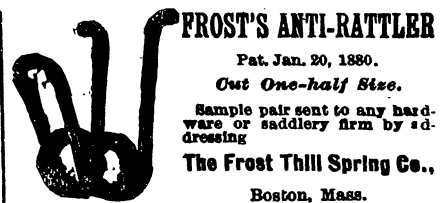
A Comb that can be Retailed at 25 Cents.

SOLD BY JOBBERS EVERYWHERE.

Manufactured by the

### SPRING CURRY COMB CO.,

117 to 119 S. Lafayette St., SOUTH BEND, IND.



FROST'S ANTI-RATTLER

Pat. Jan. 20, 1880.

Out One-half Size.

Sample pair sent to any hardware or saddlery firm by addressing

The Frost Thill Spring Co.,

Boston, Mass.

### THE WILCOX & HOWE COMPANY,

BIRMINGHAM, CONN.,

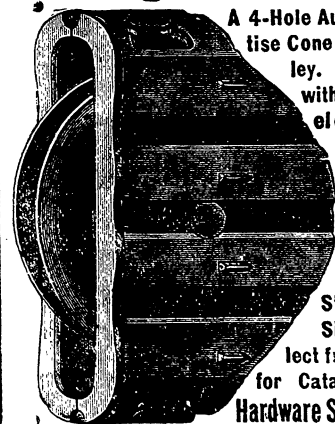
MANUFACTURERS OF

### A Full Line of Carriage Hardware

ALSO SPECIAL FORGINGS.

Estimates cheerfully given. Send for Catalogue

## IDEAL SASH PULLEY.



A 4-Hole Auger Mortise Cone Axle Pulley. Applied without chisel or Screws. Each Pulley its own marking gauge. A variety of Styles and Sizes to Select from. Ask for Catalogue of Hardware Specialties

### STOVER MFG. CO.

145 River St., Freeport, Ill.

### Motley's Adjustable Sash Holder



Patented Dec. 13, 1892.

FOR WINDOWS, NEW OR OLD, In Buildings, Cars, Steamboats, Carriages, etc. Also for Window Screens and Sliding Blinds.

Agents Wanted Everywhere.

Send for Descriptive Circular.

### PETER MOTLEY,

750 and 752 S. Broad St., Philadelphia, Pa.

### COMMON MOUSE TRAPS

BEST FOR USE!

### Ripley Mfg. Co., Unionville, Conn.



Porcelain-Lined Lemon Squeezers, Steak Hammers, Boot Jacks, Magnetic Tack Hammers, Mallets, Bung-Starts, Hand Screws, Beacon Hill Pat. Mouse Traps, Sunny-Side 2 lb. Lap Board.

# SCRANTON FORGING CO.,

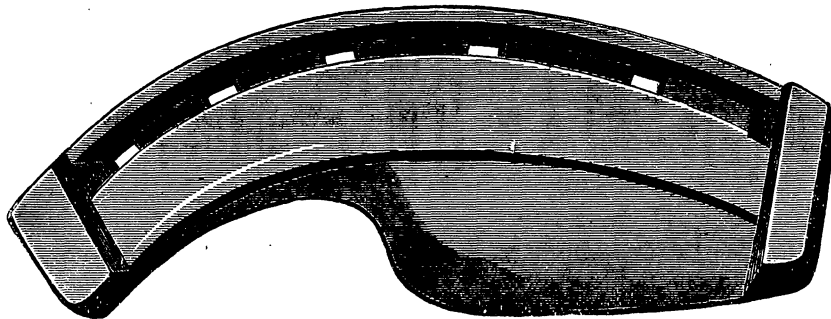
SCRANTON, PA.

## CARRIAGE HARDWARE AND SPECIAL DROP FORGINGS.

FORGED

OX

SHOES.



Made under Deeble's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

IT IS JUST RIGHT.

## Mount Carmel Steel Toe Calk Ox Shoes.

The Best and Cheapest in the World.



Blunt Calk. Seven Sizes.

**Warranted**  
to outwear  
any shoe made.

WRITE FOR PRICES.



Sharp Calk. Six Sizes.

**Walter W. Woodruff & Sons, Mount Carmel, Conn., U. S. A.**

## BURDEN'S HORSE SHOES.

"Burden Best"

Iron.

Boiler Rivets.

**THE BURDEN IRON CO.**

TROY, N. Y.

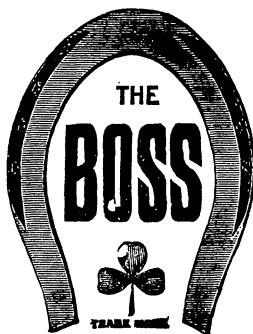
**Standard Horse Shoe Co.,**

Manufacturers of

**HORSE AND MULE SHOES.**

LEEDS, ROBINSON &amp; CO., General Agents,

75 North Street, Boston, Mass.



## HORSE AND MULE SHOES.

Superior Quality, Shape and Finish.

**BRYDEN HORSE SHOE CO.,**

CATASAUQUA, PA.

**RHODE ISLAND PERKINS HORSE SHOE CO.,**

MANUFACTURERS OF

**Horse and Mule Shoes of the Perkins Pattern.**

SPECIALTIES — X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

Works at Valley Falls, R. I.

Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, Pres.,

C. H. PERKINS, Gen. Manager,

R. W. COMSTOCK, Sec'y,

CHARLES R. STARK, Treas.

J. C. McCARTY &amp; CO., Agents - 97 Chambers Street, New York.

## THE NEW DIAMOND STATE HORSE AND MULE SHOES.

JUST TRY THEM and YOU will say they excel all others.

MANUFACTURED BY

**DIAMOND STATE IRON CO.**

WILMINGTON, DELAWARE.

Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Blank Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &amp;c.

PHILADELPHIA OFFICE,  
208 So. Fourth St.

{ Correspondence invited }

NEW YORK OFFICE  
11 Pine St.

# H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

## CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

## FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

# CHAMPLAIN

Manufactured by the NATIONAL HORSE NAIL CO.,  
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents. New York.



Elegant Iron.

Beautiful Shape.

HORSE SHOES,  
*Light, Medium and Heavy.*  
MULE SHOES,  
*Light, Medium and Heavy.*

Illustrated booklet and prices to all parts of the world on application.

OLD DOMINION IRON AND NAIL WORKS CO.,

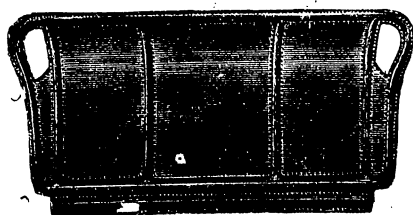
ARTHUR B. CLARKE, President.

Chicago Office, 45 La Salle St.

Richmond, Va., U. S. A.

## McKINNON DASH & HDW. CO.,

LIMITED, Manufacturers of



C. PATTERN.

## FINE QUALITY DASHES

AND

## FENDERS,

SURREY DASH. BUFFALO. - N. Y.

**P. F. BURKE, C. F. DEWICK & CO.**  
Successor to  
Manufacturer of  
**PATENT STEEL**  
(Blunt and Sharp)  
**TOE-CALKS.**  
—ALSO—  
**BURKE'S IMPROVED**  
**HORSESHOERS'**  
**FOOT VICE.**  
Send for Circulars.  
360 Dorchester Av. Die for Welding  
BOSTON, MASS. Sharp Calks.

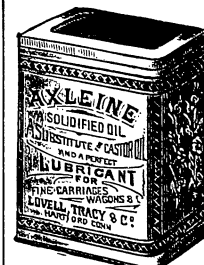
## PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.

POUGHKEEPSIE, N. Y.

New York Office, No. 66 Reade Street.

## AXLEINE



is a fine quality of Axle Grease put up in square tin boxes containing one pound; beautifully decorated in assorted colors; designed especially for the Hardware Trade. Showy and attractive shelf goods.

Send for sample and prices.

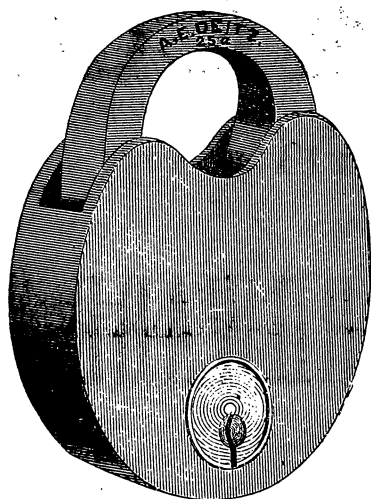
LOVELL, TRACY & CO., 71 Asylum St., Hartford, Conn.

HUGUNIN'S PAT. SCREW SASH BALANCES.

"The Old Reliable." Best, Cheapest.

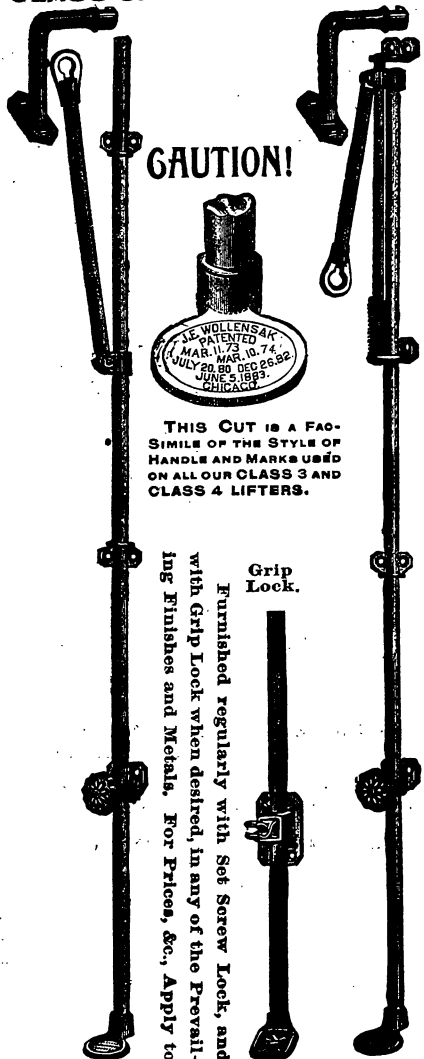
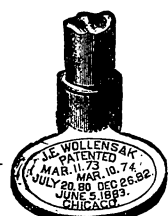
Sash work as with weights. Prices: 65c., 80c. and \$1.00 per set of four. Liberal discounts.

R. B. HUGUNIN & CO. MFG. CO., Hartford, Conn.

**A. E. DEITZ**

**J. C. McCARTY & CO., Agents,**  
97 Chambers and 81 Reade Sts., New York.

Factory, **BROOKLYN, E. D., N. Y.**

**Transom...Lifters****OLD RELIABLE****J. F. WOLLENSAK'S PATENT.****CLASS 3.****CLASS 4.****CAUTION!**

THIS CUT IS A FA-  
SIMILE OF THE STYLE OF  
HANDLE AND MARKS USED  
ON ALL OUR CLASS 3 AND  
CLASS 4 LIFTERS.

**Grip Lock.**

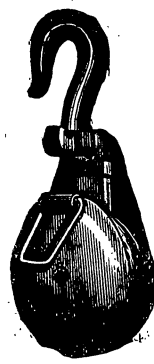
Furnished regularly with Set Screw Lock, and  
with Grip Lock when desired, in any of the Prevail-  
ing Finishes and Metals. For Prices, etc., Apply to

**J. F. WOLLENSAK, CHICAGO, ILL.**

**The Phonograph and How to Construct It.**  
With a chapter on sound. By W. GILLET. Deals  
with the construction of the phonograph in such a  
plain manner that the student will clearly under-  
stand its construction. A complete set of drawings  
to scale of the various parts of the phonograph ac-  
company the book. 87 pages, illustrated, 12mo,  
cloth .....\$2.00

For Sale by **DAVID WILLIAMS, 96-102 Reade St., N. Y.**

## WHY USE WOODEN OR HEAVY STEEL BLOCKS WHEN THE STEEL AND IRON TACKLE BLOCKS



—MADE BY—  
**The Cleveland Block Co.**

CLEVELAND, OHIO, U. S. A.,

**ARE BETTER IN EVERY WAY.**

No waste material. Every ounce of weight in the line of  
strength. No clumsy outside straps or bolts. As light as  
wooden blocks and vastly more durable. They wear, but never  
break. Sheaves interchangeable

General Agents: **Topping Brothers, 92 Chambers Street, New York.**  
**The H. Channon Co., 22 Market Street, Chicago.**  
New England Agents, - **Dodge, Haley & Co., 212 High Street, Boston.**

## NOW IS THE TIME TO PLACE YOUR ORDERS FOR HAY BLOCKS.

**Our Self-Oiling Blocks**

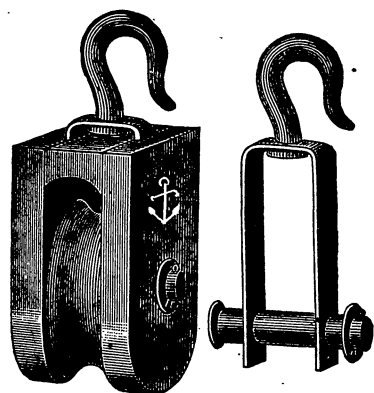
are the best for the least money. They have  
hard wood shells; wrought iron straps; forged  
steel hooks and hollow wrought iron axles per-  
forated.

MANUFACTURED BY

**Boston & Lockport Block Co.,**

LOCKPORT, N. Y., BOSTON, MASS.

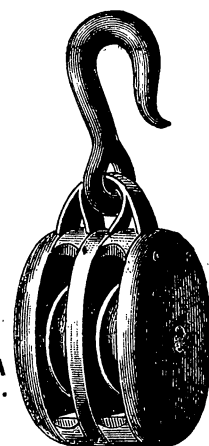
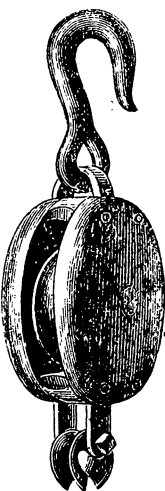
H. B. NEWHALL CO., 105 Chambers St., N. Y. } Agts.  
C. H. GURNEY CO., Chicago, Ill.



## 'S STEEL. WOOD OR IRON MADE BY TOLEDO BLOCK WORKS,

511-513-515 Water St., TOLEDO, OHIO,

WILL PROVE SATISFACTORY

**TO USER.**

**SHUBERT & COTTINGHAM,**  
MANUFACTURERS OF

**Round Edge Tackle Blocks,**

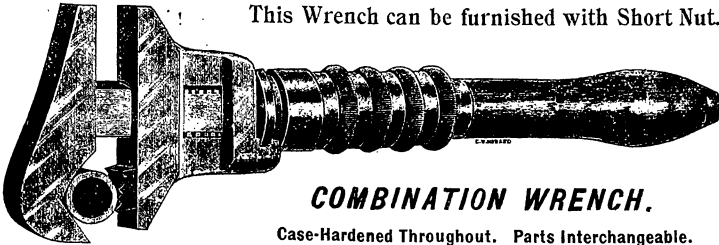
118 North Delaware Avenue,  
Factory, Beach and Norris Sts., PHILADELPHIA

GENERAL AGENTS:  
**BRITTAN & BOND,**  
154 Lake St., Chicago, Ill.

**HIGH GRADE CAN OPENER.**

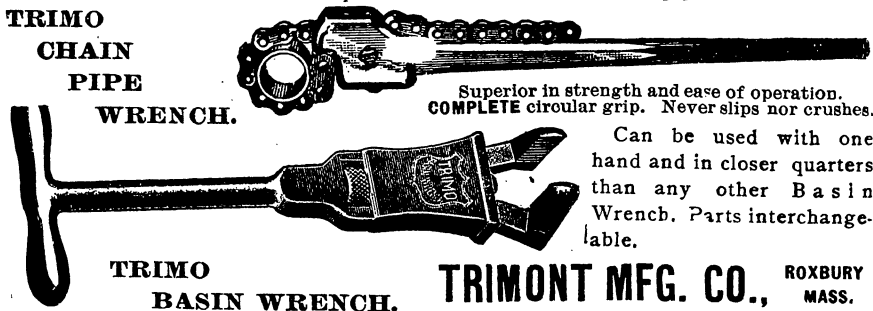
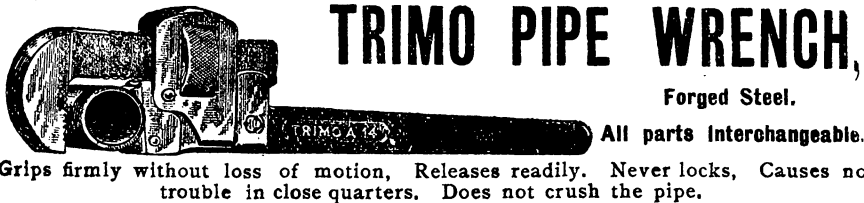
**A. F. Meisselbach & Bro., Mfrs., Newark, N. J.**  
— ALL JOBBERS. —

# BUFFALO SCALE CO., Buffalo, N. Y. SCALES OF ALL KINDS.



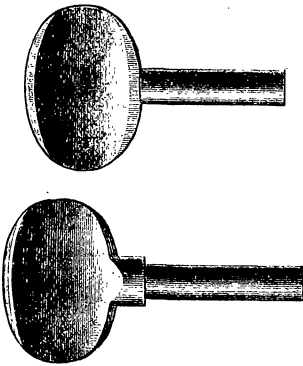
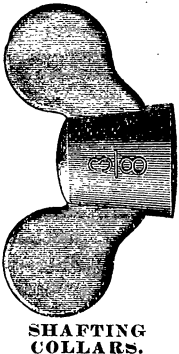
This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal. For Circulars and Price-List, address

**BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass., U. S. A.**

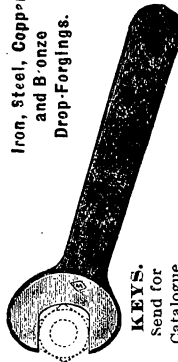


J. H. Williams & Co.,  
9 to 15 Richards St., BROOKLYN.

TRACK  
WRENCHES.



Iron, Steel, Copper  
and Bronze  
Drop-Forgings.



## DOUBLE END WRENCHES



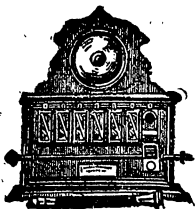
For Standard Hexagon Nuts  
Finished or Unfinished

**"DROP FORGED from BEST BAR STEEL**  
in Lengths from 6 to 24 inches

Taking Nuts for  $\frac{1}{4}$  up to and including Nuts for  $1\frac{3}{4}$  inch bolts

**THE BILLINGS & SPENCER CO.**

**HARTFORD, CONN.**



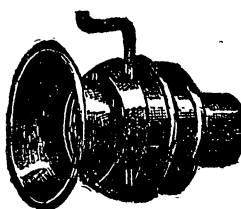
**W. R. OSTRANDER & CO.,**

195 and 197 FULTON ST., NEW YORK.

Manufacturers of

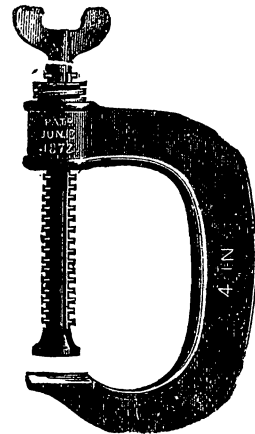
SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC, MECHANICAL & PNEUMATIC ANNUNCIATORS & BELLS.

Complete Outfits of Speaking Tubes, Whistles, Electric, Mechanical and Pneumatic Bells. A full line always in stock. Send for new catalogue. Factory, DeKalb ave., near Knickerbocker, Brooklyn, N. Y.



PATENTED ARTICLES

**MALLEABLE IRON,**  
Hammer's Adjustable Clamps.



**Hammer's** Malleable Iron Oilers, 3 Sizes.  
Malleable Iron Hand Lamps.  
Malleable Iron Hanging Lamps.  
**NEW** pattern Heavy Screw Clamps.  
Strongest in the market.  
For sale by all the principal Hardware dealers.  
Send for Price List.

**MALLEABLE IRON CASTINGS**  
of superior quality and Hardware Specialties  
in Malleable Iron made to order.

**HAMMER & CO.,**  
Branford, Conn.

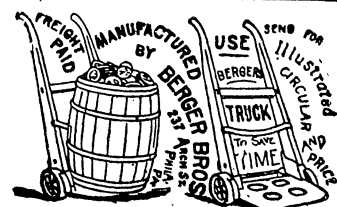
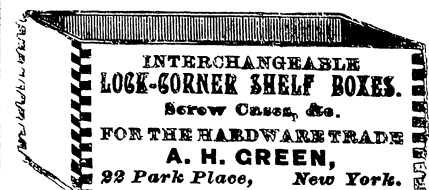
**HOWARD IRON WORKS**

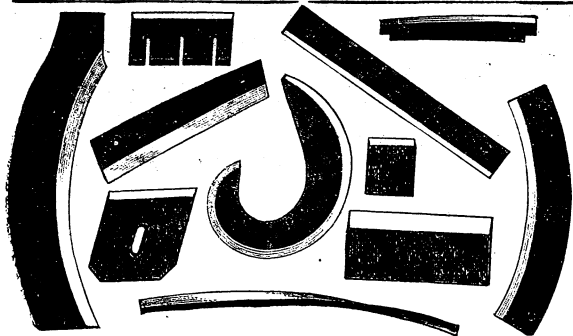
**BUFFALO, N. Y.**

Manufacturers of

## BENCH VISES.

Price Lists sent on application.





## LORING COES & CO.

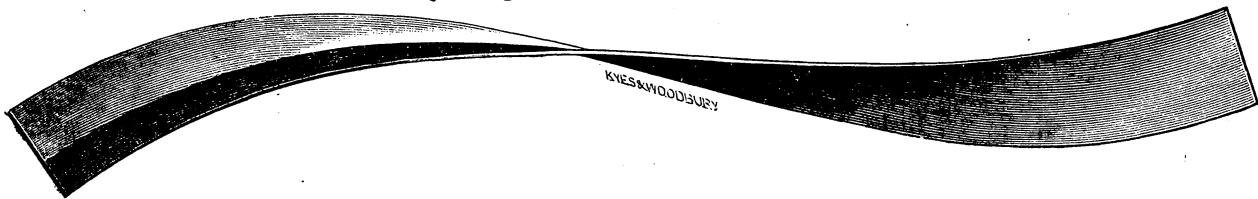
WORCESTER, MASS.

Manufacturers of **MACHINE KNIVES.**

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies, Lawn Mower and Hay Cutter Knives of every description.

End view of Plated Stock for Dies, Lawn Mower Knives, Blades

Etc., showing how the Steel is laid.



## THE IMPROVED ACME STEEL WRENCH

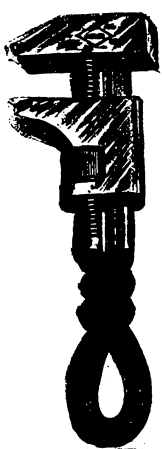
PATENTED.

**CAPITOL MFG. CO.,**

Cable Address: "CAPITOL, CHICAGO."

125 to 137 REES STREET,  
CHICAGO, ILL., U. S. A.

Awarded Prize Medal at Paris Exposition and Jamaica Exposition



ACME-  
Standard Bright  
Finish.



HERCULES,  
Combination Pipe, Bolt and  
Nut Wrench. Bright Finish



The Hercules Screw Driver and Tack Claw (Patented).

This Screw Driver is made from one piece of special cast steel, in all sizes, from 1 1/4 in. to 12 in. The blade is well polished, carefully tempered, and every screw driver is subjected to a severe test and warranted. Handles Japanese with the best quality baking Japan.

**The Strongest and Most Durable Wrench and Screw Driver Made.**

Write for Prices and Full Information.

HARMON & DIXON, 118 Chambers St., New York, N. Y., Eastern and Export Agents.



## L. COES'

Genuine Improved  
**KNIFE HANDLE  
PATENT**

## Screw Wrenches

MANUFACTURED BY

**COES WRENCH CO.,**  
WORCESTER, MASS

Established in  
1839.

Registered  
March 31, 1874.

Patented July  
8, 1880.

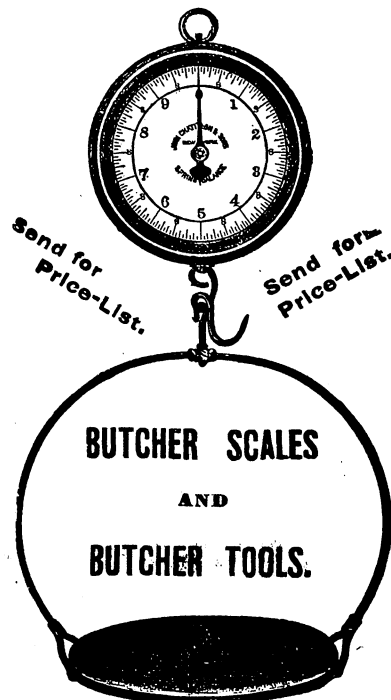
Patented July  
8, 1884.

Sectional View Illustrates our New Knife Handle, showing Malleable Iron Frame and Shank of Bar keyed into position.

17 Straight Bar, Extra Long Nut for Screw in Jaw.

**The BEST MADE and STRONGEST WRENCH in the MARKET**

J. C. McCARTY & CO.,  
JOHN H. GRAHAM & CO. } New York Agents.



Send for  
Price-List.

Send for  
Price-List.

**BUTCHER SCALES  
AND  
BUTCHER TOOLS.**

**JOHN CHATILLON & SONS,**  
85, 87 and 89 Cliff St., New York.

**IMPROVED MINE LAMP.**  
FOR ANTHRACITE AND BITUMINOUS MINING.

6 DIFFERENT STYLES OF SPOUTS.

SEAMLESS BRASS COLLAR  
BRASS HINGE  
Solid Lid  
No SOLDERING

**B. E. LEONARD, Scranton, Pa.**

**PATENT AIR TUBE MINE LAMP.**  
FIVE DIFFERENT SIZED SPOUTS.

SEAMLESS BRASS COLLAR  
BRASS HINGE  
Solid Lid  
NO SOLDERING  
HINGE CANNOT MELT OFF.

SEND 15 CENTS FOR SAMPLE TO SAMPLE

**T. F. LEONARD - Scranton, Pa.**



**LE COUNT'S HEAVY STEEL DOG,**

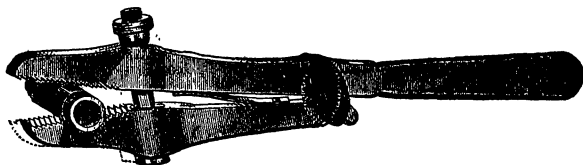
With Steel Screws. U. S. Standard and the points hardened.



1.....	3/8.....	\$0 40	13.....	2 1/4.....	\$1 35
2.....	1/2.....	50	14.....	2 1/2.....	1 45
3.....	5/8.....	60	15.....	3.....	1 60
4.....	3/4.....	80	16.....	3 1/2.....	1 80
5.....	7/8.....	70	17.....	4.....	2 10
6.....	1.....	70	18.....	4 1/2.....	2 75
7.....	1 1/8.....	80	19.....	5.....	3 25
8.....	1 1/4.....	80	Full set of 19, \$23.60.		
9.....	1 1/2.....	95	20(extra)	5 1/2.....	4 00
10.....	1 3/4.....	95	21.....	6.....	5 00
11.....	1 7/8.....	1 10	22.....	7.....	6 00
12.....	2.....	1 20	23.....	8.....	7 00
One small set of 8, by 1/4 in. to 2 in. .... 6 25					
One set of 12, by 1/4 in. to 2 in., continued by 1/2 in. to 4 in. .... 13 20					

When ordering, state as above, whether a full set, or a set of 12, or small set of 8, is wanted.

SEND FOR CATALOGUE OF FULL LINE OF MACHINISTS' TOOLS.

**C. W. LE COUNT, MANUFACTURER, SO. NORWALK, CONN., U. S. A.**  
These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.**THE "CURTIS" WRENCH.**

Patented April 8, 1890.

The most Effective, Reliable and Perfect Wrench in the market

— MANUFACTURED ONLY BY —

**AMERICAN SAW CO., Trenton, N. J.**

SEND FOR CATALOGUE.

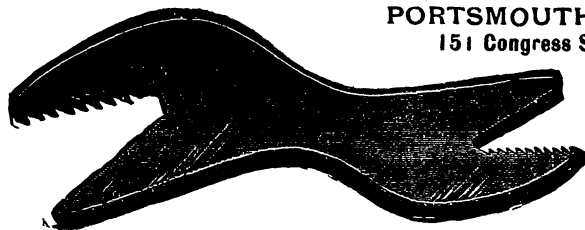
**"ALWAYS READY" WRENCH.**

FORGED STEEL, NICKEL PLATED

PORTSMOUTH WRENCH CO.,

151 Congress St., Boston, Mass.

SEND FOR PRICES.



Machinists, Carriage Makers, Blacksmiths, Mechanics, Spinners, Weavers, Carders, and in all Departments of Woolen and Cotton Mills, Farmers, Housekeepers, and in fact everybody that ever uses a wrench

**NEEDS THIS ONE.****THE W. BINGHAM CO.,**146, 148 and 150 Water St., and 97 and 99 Superior St.,  
**CLEVELAND, O.****LAWN MOWERS FOR 1893.**

THE BINGHAM.

THE RED CLOUD,

THE

TRADE MARK

THE DIAMOND HIGH GRASS.

THE PHILADELPHIA.

WRITE FOR PRICES.

**SICKELS, SWEET & LYON,**

Wholesale Hardware.

Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

**SELLING AGENTS FOR**

"Perfection" and "New Easy" Lawn Mowers,

Cortland Door and Window Screens,

"Eagle" Files,

Union Steel Screws.

Full line Steel and Wood Farming Tools. Shipments from Factories or Store.

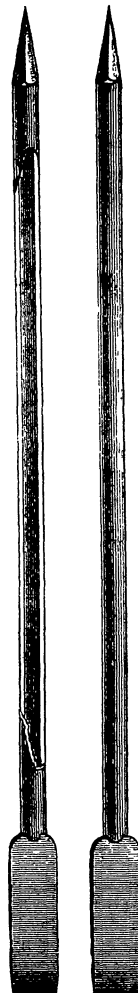
Spring Catalogue No. 5 Issued in February.

**SICKELS, PRESTON & NUTTING CO.,**

Wholesale Hardware and Tinnery's Stock.

N. Y. Office as above.

DAVENPORT, IOWA.

**Shimer's Patent  
Hollow Handled  
Post Hole Digger.***The lightest, strongest and  
easiest handled Digger  
in the market.*

Write for Discounts to

**L. & R. Wister & Co.,**

SOLE AGENTS,

PHILADELPHIA, PA.

**HOW TO KEEP A STORE**

BY S. H. TERRY.

406 PAGES, 5 x 7 1/2 INCHES.

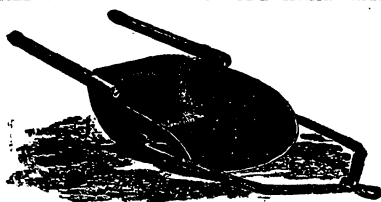
POST-PAID, \$1.50.

Among the subjects discussed are: The selection of a business; choice of a locality; buying a stock of goods; examining, marking and arranging goods; how to advertise; employment of clerks; selling for cash and credit; keeping accounts; expenses; copartnerships; losses by fire, theft, &amp;c.; influences of social life on business; buying at auction; investment of profits; insolvency; business qualifications

FOR SALE BY

DAVID WILLIAMS, Publisher and Bookseller

96-102 Reade St., New York.

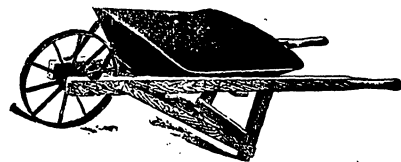


# Selling Cheap Goods

Is in a certain sense misleading, usually such are poorly constructed or have no special merit to recommend them. The wise merchant finds his best trade with customers who desire that the article to be bought shall at once be

*Both Good and Cheap. Examine Our Line.*

**The Kilbourn & Jacobs Mfg. Co.,**  
Columbus, O., U. S. A.



## Machinery Pattern Making

CONTAINING  
FULL SIZE PROFILES OF GEAR TEETH  
AND FINE ENGRAVINGS ON FULL-PAGE  
PLATES, ILLUSTRATING MANNER OF  
CONSTRUCTING NUMEROUS AND  
IMPORTANT PATTERNS AND  
CORE BOXES.

By **P. S. DINGEY,**  
Practical Pattern Maker and Mechanical Draftsman.  
376 Fine Illustrations; 12mo. cloth, \$2.

### CONTENTS.

The Pattern Maker and His Trade.  
The Pattern Shop—Its Position, Size and Requirements.  
Marking and Recording Patterns.  
Printing-Press Cylinders.  
Differential Chain Pulleys.  
A Handy Tool for Laying out Hexagon Nuts.  
How to Cast Journal Boxes on Frames.  
How to Strike an Arc by the Aid of Three Points.  
Key-Heads for Motion Rods—The way to lessen the cost of their production.  
Elbow and Tee Pipes—A quick method for turning the patterns and core boxes in the Lathe.  
Slide-Valve Cylinders.  
Corliss Cylinders—With a full description, showing how to construct patterns and core-boxes which can be changed at short notice for different stroke engines.  
Fly Wheels—Different styles.  
Engine Frames—How to build the pattern to serve for various strokes.  
Spur Gears—How the teeth should be made.  
Bevel Gears—The manner of laying them out.  
How to Lay Out the Thread of a Worm for the Pattern.  
Worm Wheels—The way to get the angle of teeth and the manner of fastening them on.  
Sweeping Straight Winding Drums.  
Making Winding Drums from Patterns—Method of cutting the groove.  
Making Sheaves from Core Boxes.  
Making Sheaves from Patterns.  
Sheaves with Wrought-Iron Arms—An original way of making the Hub.  
A Machine for Sweeping Conical Drums—Designed by the author.  
Gear Teeth—One hundred and Twenty-eight full size different profiles of Gear Teeth from 1" to 3" Pitch, suitable for gears having from 14 to 800 teeth.  
Table showing at a glance the required diameters of Gear Wheels for a given number of teeth and pitch.  
Weight of Cast-Iron Pipe.  
" " Cast-Iron Balls.  
" " Round Cast Iron.  
" " Square Cast Iron.  
" " Flat Cast Iron.  
" " Superficial Foot of Cast Iron from 1/4" to 3/4" thick.  
" " Round lead.  
" " Square lead.  
Binary and Decimal Fractions.  
Table which gives distances to open a 2-ft. rule for obtaining angles from 1° to 90°  
Metric Measure reduced to inches.

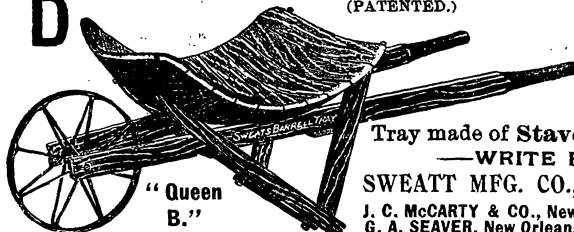
*Sent, Postpaid, on receipt of price, by*

**DAVID WILLIAMS, Bookseller & Publisher**

96-102 Reade Street, New York.

## "BARREL TRAY" WHEELBARROWS.

(PATENTED.)



**BEST** TRAY  
FRAME  
WHEEL.

Tray made of Staves strung on Iron Rods.  
—WRITE FOR PRICES.—  
**SWEATT MFG. CO.,** Minneapolis, Minn.  
**J. C. McCARTY & CO.,** New York, Direct Representatives.  
**G. A. SEEVER,** New Orleans, Special Agent.

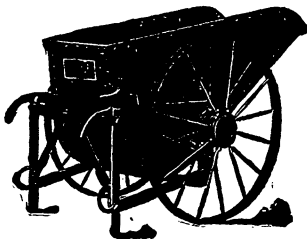


**STEEL BARROWS.**

**LANSING WHEELBARROW CO.**  
LANSING, MICH.

## THE AKRON TOOL CO., Akron, O. Balanced Charging Barrows,

McNeil's Patent.



AUTOMATIC DUMP. IT HAS NO EQUAL.

ALSO

**AKRON TUBULAR STEEL WHEEL-  
BARROWS**

ONE MAN CAN HAUL A TON. RE-ENFORCED TRAY. CORNERS DOUBLE THICKNESS.

## HENLEY'S LAWN MOWERS

First-class high grade machines,  
made of the best materials. Neat,  
symmetrical, strong, dura-  
ble and unexcelled in con-  
struction and ease of oper-  
ation. Does perfect work.  
For prices address



**M. C. HENLEY, Sole Mfr., Richmond, Ind., U. S. A.**

GARPENTER & BAYLES, Eastern Agents, 91 Chambers St. & 73 Reade St., New York City.

## ALL STEEL WHEELBARROWS AND SCRAPERS,

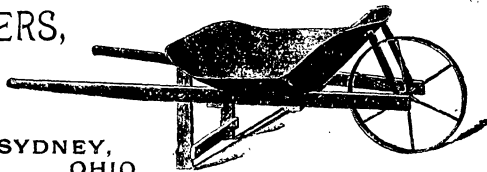
MANUFACTURED BY

**AMERICAN STEEL  
SCRAPER CO.,**

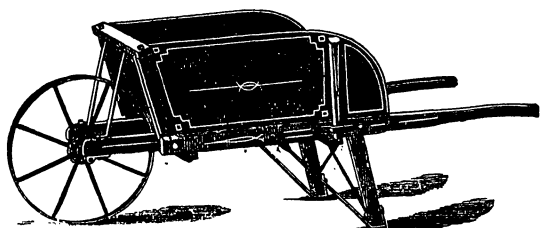
SYDNEY,  
OHIO.



Write  
for  
Catalogue

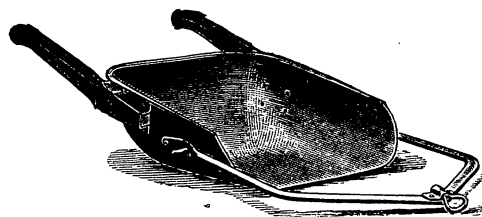


No. 1104 COURT ST.



unite in saying that they get more work, more satisfaction and wear out of the Sidney goods than any other. **Because they are Best.**

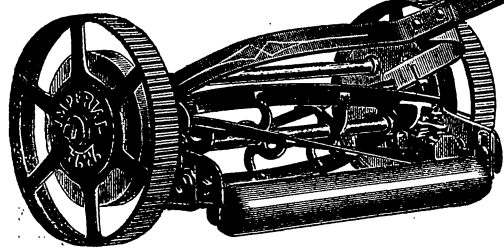
**Sidney Steel Scraper Co.,** 924 Poplar Street, SIDNEY, O.



# THEY ARE BEST BECAUSE THEY ARE.

## COLDWELL LAWN MOWER COMPANY,

The Most Complete Line of LAWN MOWERS, and the best LAWN RAKE in the Market.



IMPERIAL,  
HIGH WHEEL,  
STANDARD,  
NEW YORK,  
MODEL.

Newburgh, N. Y.

Our IMPROVED HORSE LAWN MOWER Has no Competitor.

Different Styles and Prices, but *All Good Sellers*. Our paper, "THE LAWN," mailed free to any address.

### THE REX Lawn Mower.

Fully Guaranteed.

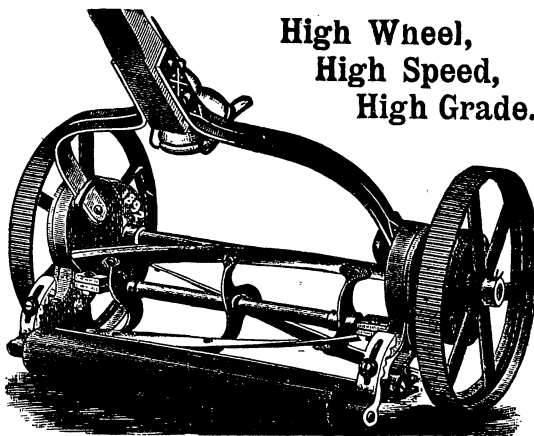
The Best Possible Lawn Mower for the Least Possible Money.

MANUFACTURED BY

**W. E. LAPE,**

Syracuse, N. Y.

**C. E. WOODFUFF,**  
235 Lake Street, Chicago,  
Western Sales Agent.



High Wheel,  
High Speed,  
High Grade.

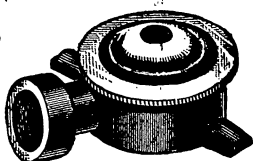


Japanese No. 12, Adjust

### LAWN SPRINKLERS

We manufacture the BEST and CHEAPEST Lawn Sprinklers in the World.

Cactus No. 9.

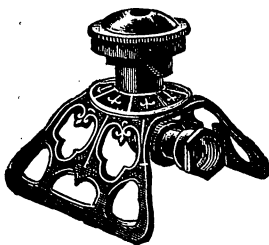


The only Sprinklers which have no revolving parts to leak or wear out.  
The only Sprinklers free from small holes, and which cannot become clogged with gritty substances.

The only Sprinklers which are adjustable and will give a spray as fine as the mist of Niagara, or as heavy as the area of the supply pipe.

The best Sprinklers for high pressures, and the only sprinklers which will give satisfaction with low pressures.

We also manufacture the old style revolving sprinklers, but for our own use would not have them as a gift.

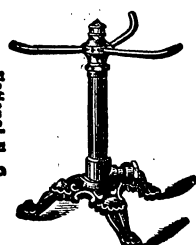


Cactus No. 6.

**ETTE & HENGER MFG. CO.**

ST. LOUIS MO.

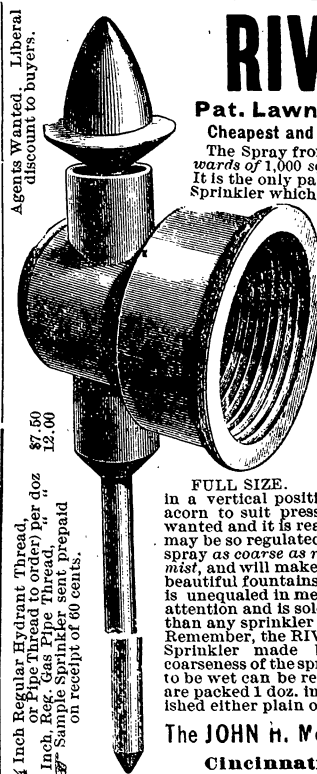
SEND FOR DESCRIPTIVE CIRCULARS.



National No. 4.

Agents Wanted. Liberal discount to buyers.

¾ Inch Regular Hydrant Thread, or Pipe Thread to order, per doz \$7.50  
1 Inch Reg. Gas Pipe Thread, " " 12.00  
1 ½" Sample Sprinkler sent prepaid on receipt of 60 cents.



### RIVAL

Pat. Lawn Sprinkler

Cheapest and Best in Use.

The Spray from it covers upwards of 1,000 sq. feet of lawn. It is the only patent adjustable Sprinkler which is adaptable to any water pressure. Being made of brass, and having no revolving parts to wear out, or small openings to clog up, it can be operated with sandy or muddy water as well as clear, and will last for years. To operate, a few screw Sprinkler on end of hose, stick thereto in to the ground

In a vertical position, adjust the acorn to suit pressure and spray wanted and it is ready for use. It may be so regulated as to throw a spray as coarse as rain or as fine as mist, and will make one of the most beautiful fountains imaginable. It is unequalled in merit, requires no attention and is sold at a less price than any sprinkler in the market. Remember, the RIVAL is the only Sprinkler made by which the coarseness of the spray and the area to be wet can be regulated. They are packed 1 doz. in a box, and finished either plain or nickel plated.

**FULL SIZE.**  
In a vertical position, adjust the acorn to suit pressure and spray wanted and it is ready for use. It may be so regulated as to throw a spray as coarse as rain or as fine as mist, and will make one of the most beautiful fountains imaginable. It is unequalled in merit, requires no attention and is sold at a less price than any sprinkler in the market. Remember, the RIVAL is the only Sprinkler made by which the coarseness of the spray and the area to be wet can be regulated. They are packed 1 doz. in a box, and finished either plain or nickel plated.

The JOHN H. MCGOWAN CO.

Cincinnati, Ohio.

**Pumps and Pumping Machinery.** Part 1. By FREDERICK COLYER, M. Institute C. E. Second edition, revised and enlarged. Synopsis of contents: Lift Pumps.—Driving gear. Beer, tar, vinegar, sewage and well pumps, &c. Force pumps, various kinds. General details of lift and force pumps. Arrangement of engine and pumps. Depth of suction, water towers, &c. Sundry pumps.—Centrifugal, drainage and dock pumps, chain pumps, air pumps, blowing engines and compressors. Engines for working pumps. Horizontal high-pressure engines. Compound engines. Vertical engines. Quadruple-expansion engines. Data of working results, &c., &c. Cornish engines. Beam and bull engines. Fuel consumed. Boilers, vertical, cylindrical, Cornish, Lancashire, multitubular, patent water tube boilers, &c. Engine houses, details of construction, fittings for rooms, &c. Boiler houses. Index. 200 pages. 53 large folding plates to scale. Cloth, 8vo.....\$10.00

For Sale by David Williams 36-102 Reade St., New York

## Chadborn & Coldwell Manufacturing Co.,

**NEWBURGH, N. Y.**

Chicago, Ill., 55-57 N. Clinton Street.  
London, Eng., 223 Upper Thames Street.

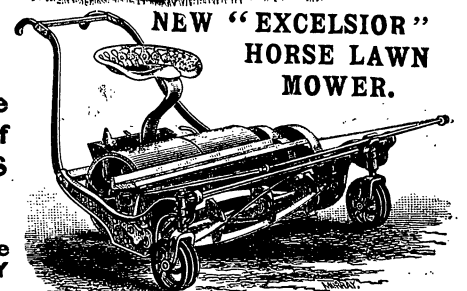
Manufacturers of  
**THE "NEW MODEL,"**  
**"NEW MODEL" HIGH WHEEL,**  
**The "O. K.,"**  
**The "RIVAL,"**  
**"EXCELSIOR" ROLLER,**  
**and "EXCELSIOR" HORSE**  
**Lawn**  
**Mowers.**



**The Most extensive  
manufacturers of  
LAWN MOWERS  
in America.**

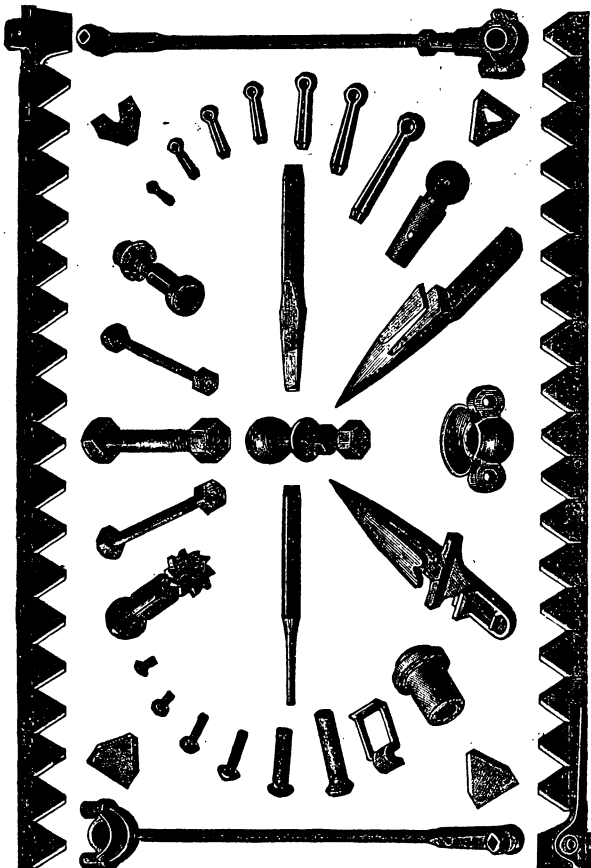
**Every Lawn Mower we  
manufacture is FULLY  
WARRANTED.**

**IT WILL PAY YOU TO SEND TO US FOR DESCRIPTIVE  
CATALOGUE AND TRADE DISCOUNTS BEFORE PLACING  
YOUR ORDERS FOR LAWN MOWERS FOR THE COMING  
SEASON.**



**NEW "EXCELSIOR"  
HORSE LAWN  
MOWER.**

**SECTIONS, KNIVES, GUARDS,**  
**AND SPECIAL EXTRAS FOR HARVESTING MACHINES.**



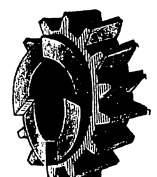
Send us your Specifications. We can Save you Money.

## WHITELEY

SPIRAL GEAR NOISELESS

## LAWN MOWER,

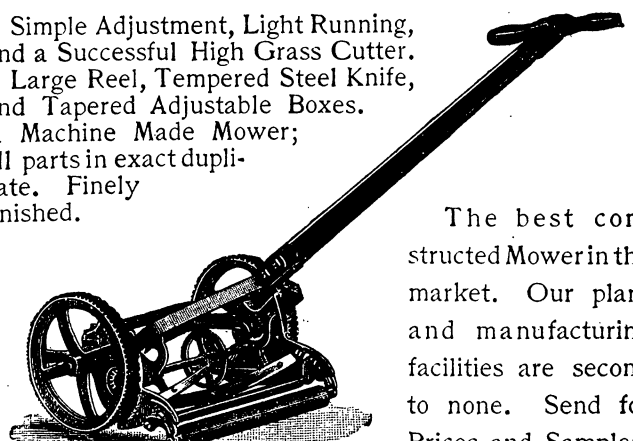
Without Pawls, Springs or Loose Parts.



The above cuts represent the clutch, pinion, tapered slotted adjustable box, and adjustable nut for same.

Simple Adjustment, Light Running,  
and a Successful High Grass Cutter.

Large Reel, Tempered Steel Knife,  
and Tapered Adjustable Boxes.  
A Machine Made Mower;  
all parts in exact duplicate. Finely  
finished.



The best constructed Mower in the  
market. Our plant  
and manufacturing  
facilities are second  
to none. Send for  
Prices and Samples.

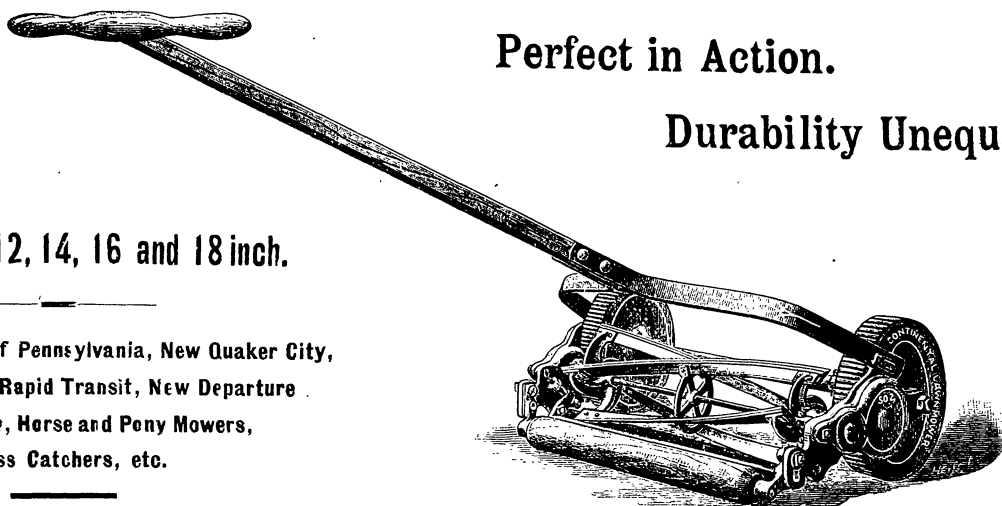
Works to perfection and sells at sight.

**WILSON, WHITELEY & CO., Manufacturers, Springfield, O.**

# THE CONTINENTAL LAWN MOWER

HAS NEVER FAILED TO GIVE PERFECT SATISFACTION.

TRAIN OF GEARS EACH SIDE.



Perfect in Action.

Durability Unequaled.

Style of 10, 12, 14, 16 and 18 inch.

Also Manufacturers of Pennsylvania, New Quaker City,  
Great American, Rapid Transit, New Departure  
Lawn Mowers, Horse and Pony Mowers,  
Grass Catchers, etc.

There is no question for doubt that the manufacturers of these Mowers manufacture double the quantity of Lawn Mowers of any other manufacturer in the known world, and have not made their reputation from price alone, but from the quality of Mowers turned out.

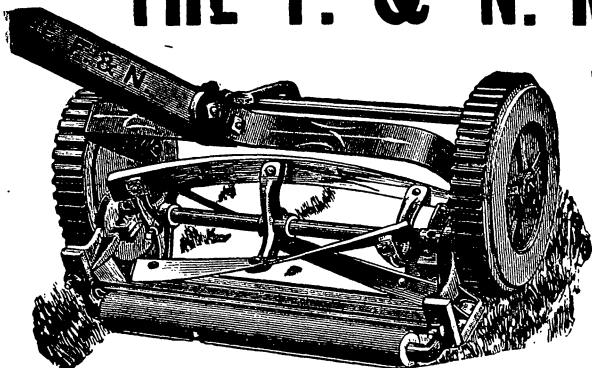
**SUPPLEE HARDWARE CO.,**

(Watch this space every week.)

**PHILADELPHIA.**

**BLAIR MANUFACTURING CO. SPRINGFIELD, MASS.**  
MANUFACTURERS OF  
**LAWN SPRINKLERS, TURF EDGERS, & C.**  
Write for Circulars and Prices. **LAWN MOWERS OF HIGHEST GRADE**  
FOR HAND AND HORSE-POWER.

**THE F. & N. MFG. CO.,**



Manufacturers of  
**Lawn Mowers, Lawn  
Sweepers  
and Grass Catchers,**  
**RICHMOND, IND., U.S.A.**

The F. & N. High Grade Lawn  
Mower. Fully Guaranteed.

AGENTS:

Woodrough & Hanchett Co.,  
Chicago, Ill.  
C. F. Guyon Co., Ltd., New York.  
Woodrough, Mansfield & Co.  
Boston Mass.

**A. M. ROSS & CO.,**  
ILION, N. Y.



(Successors to  
REMINGTON  
AG'L CO.)

Manufacturers of the best Wood and Iron Beam  
Steel, or Carbon, Right or Left Hand Plows in market.  
Also Standard Solid Steel Shovels, Coal Shovels,  
Coal and Grain Scoops and Spades, and the new  
patent Steel Snow Shovels. Furnace, Coal and Ash  
Scoops, Ice Choppers and Lawn Trimmers, Lawn  
Weeders, Garden Trowels, &c., &c. Send for prices..



*Manufacture To Order*  
**SPECIALTIES & NOVELTIES, PATENTED ARTICLES,  
HARDWARE GOODS ETC., SMALL OR FINE MACHINERY.**  
SEND FOR CATALOGUE - CORRESPONDENCE SOLICITED  
**OTTO KONIGSLOW CLEVELAND, O.**

**The Cockburn Barrow and Machine Co.**

OFFICE AND WORKS:

234 to 240 Eleventh St., - JERSEY CITY, N. J.  
**NEW CONCRETE MIXING MACHINES.**

Coal and Ash Buckets, Coaling Tubs, Coal and Coke  
Cars, Patent Tubular Frame Wheelbarrows, Furnace  
Charging Barrows and Cars, Sheet Iron Work of every  
description, Patent Power Punching Machines, Every  
Description of General Forgings, Dimpfel Blowers,  
Machine Work.

# BUCKEYE Sr. AND GLOBE LAWN MOWERS.

Made in 10, 12, 14, 16 and 18 inch cut.

ALSO MANUFACTURERS OF

BUCKEYE JR. AND

CHAMPION LAWN MOWERS.

All of Which are First-Class in Quality  
Durable and far Surpassing all

and Finish, Lightest Running,  
other Machines Made.

BUCKEYE

FORCE PUMPS.

Send for Circulars and Prices to

MAST, FOOS &  
CO.,

IRON TURBINE AND COLUMBIA STEEL

WIND ENGINES AND  
STEEL DERRICKS.

Springfield,  
Ohio.

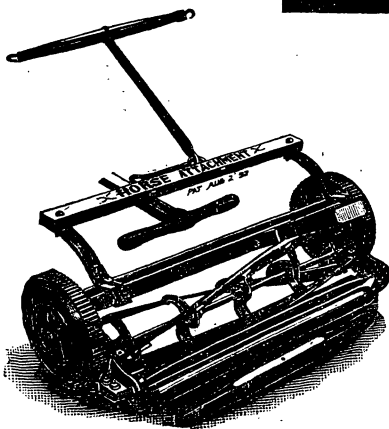
BUCKEYE

IRON FENCING

The  
CHIEF

## Lawn Mower

With Horse  
Attachment.



TEN INCH TRACTION WHEEL. EXCELS FOR FINE QUALITY OF MATERIAL AND  
FINISH. SIMPLE ADJUSTMENTS, SMOOTH CUTTING.

THE ONLY FIRST-CLASS COMBINATION MOWER ON THE MARKET. PRICES LOW.  
TERMS REASONABLE.

MANUFACTURED BY

### CHAMPION MFG. CO.,

257 Ft. Wayne Ave., Richmond, Ind.

LAWN MOWERS, RAKES, Etc.

## GENUINE PHILADELPHIA LAWN MOWERS.

### 350,000 IN THE FIELD.

Hand Sizes 10 to 20 inch.

Pony and Horse 30 and 36 inch.

### Lawn Sweepers and Collectors.

Send for Price-List and Discounts.

GRAHAM, PASSMORE & CO.,

No. 631 Market St, Philadelphia, Pa.

## HARDWARE DEALERS,

What are you going to do?  
Still continue to have your  
own city decorated with old  
wooden gnawed up hitching  
posts, when there is good  
money for you in selling iron  
ones? Very ornamental.  
Prices extremely cheap.

Write for Circulars  
and Prices.

M. H. DETRICK,  
STERLING, ILL.



## THE LAWN MOWER'S PARTNER.

It is adjustable to all sizes and makes of Mowers.

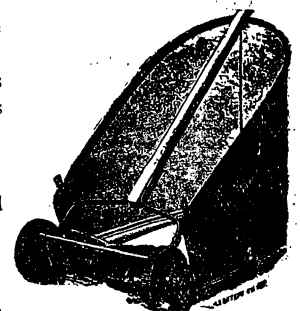
It will outwear and carry more grass at one time  
than any other of the so called Carriers or all others  
combined. It is much better than those cheap canvas  
bags that are called Grass Carriers, which are useless  
and dear at any price.

**WE GUARANTEE SATISFACTION.**

See our exhibit at World's Fair Horticultural Hall and  
write us for explanatory circular and new price-list.

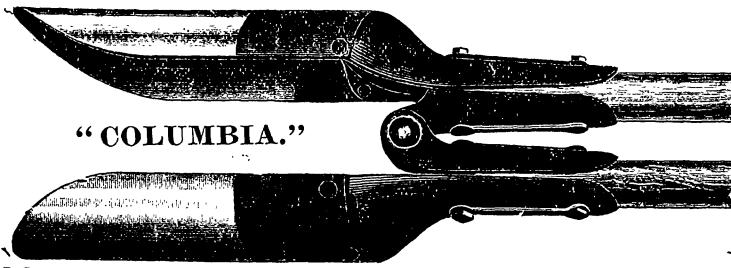
**GLENNON & KRAUSE,**

Manufacturers, 76th & Wallace Sts., Chicago, Ill.



PATENTED MARCH 17, '91.





"COLUMBIA."

## Post Hole Diggers AND LAWN RAKES

are the goods on which we lead, having the largest, best and most complete line on the market.

PRICES BOTTOM.

JOHN H. GRAHAM & CO., Agents,  
113 Chambers St., New York,

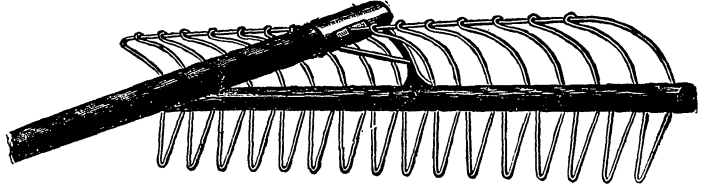
OR

GIBBS MANUFACTURING CO.,  
CANTON, OHIO.

## The "Gem" Steel Wire and Davis Lawn Rakes

The only perfect and most durable LAWN RAKES on the market. They are guaranteed to give better satisfaction than any other. Send sample order and write for prices.

SCHAEFFER & CO., Dayton, O.

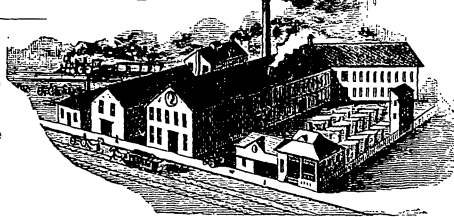


Largest Post Hole Digger  
Factory in the World.

CANTON, OHIO.

THE  
"INVINCIBLE"

(Under our "Little  
Giant" Patent,  
July 10, '83.)



### OUR LATEST in the DIGGER LINE.

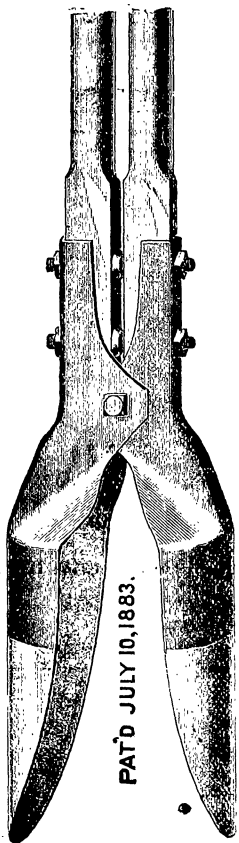
Each Blade and Shank is dropped out of a single piece of Steel, properly tempered. No cast or Malleable Iron parts. Handles separate and easily grasped. We make five styles, Little Giant, Hercules, Invincible, Scheidler, New Champion.

Write for Catalogue of Diggers, Saw Sets, Curry Combs, &c.

Look out for Imitations.—Infringers promptly prosecuted.

F. E. KOHLER & CO.,  
CANTON, OHIO.

J. C. McCARTY & CO., 97 Chambers St., N. Y.



## HAY KNIVES

SEASON OF 1892-93.

"LIGHTNING"

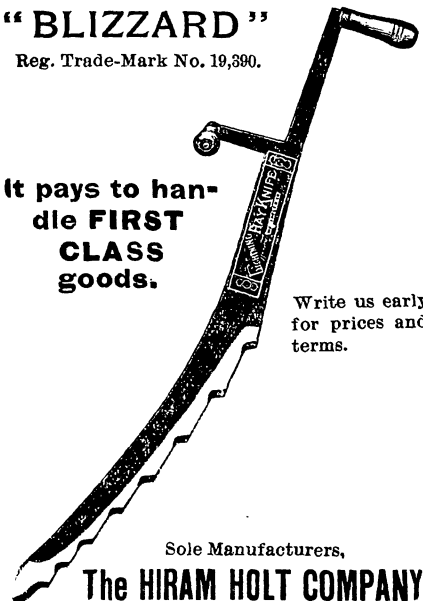
(Reg. Trade-Mark No. 9583.)

"BLIZZARD"

Reg. Trade-Mark No. 19,390.

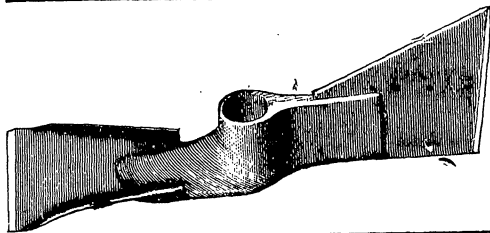
It pays to handle  
FIRST  
CLASS  
goods.

Write us early  
for prices and  
terms.



Sole Manufacturers,

The HIRAM HOLT COMPANY,  
EAST WILTON, MAINE.

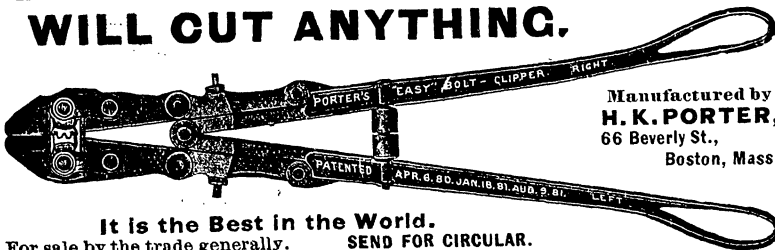


"THE EUREKA LAWN MATTOCK"

Is designed as a tool for many purposes, such as trimming paths, drives, cutting brush, weeds, thistles or ice, loosening up hard earth in gardens or flower-beds, etc., etc. It has steel blades cast in the head and is one of the most convenient tools for general use ever made, its price bringing it within the reach of all. Address

THE RAILWAY SPEED REDORDER CO.,  
KENT, O.

## THE "EASY" BOLT CLIPPER. WILL CUT ANYTHING.



Manufactured by  
H. K. PORTER,  
66 Beverly St.,  
Boston, Mass.

It is the Best in the World.  
For sale by the trade generally. SEND FOR CIRCULAR.

23,000 Sold.



DO YOU SELL THE  
BUCHANAN COMBINED WIRE REEL?

IF NOT SEND FOR CIRCULARS & PRICES.

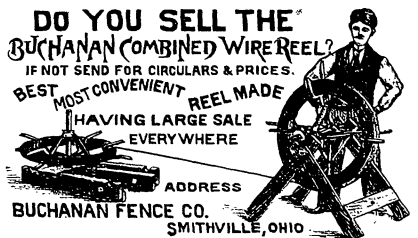
BEST MOST CONVENIENT REEL MADE  
HAVING LARGE SALE EVERYWHERE

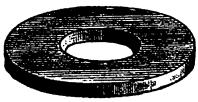
ADDRESS  
BUCHANAN FENCE CO.  
SMITHVILLE, OHIO

## The "Reliable" WEED KILLER.

Strong, Simple, Sure. A Seller.

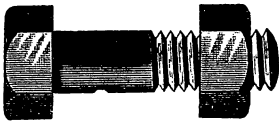
Able agents who are money makers wanted.  
Write  
SHAW & CLANCY,  
RACINE, WIS.





# WROUGHT WASHERS

Every Washer.  
**FLAT**  
With hole in  
**TRUE CENTER.**



## MACHINE BOLTS.



## HOT PRESSED NUTS.

Highest  
Standard of  
**EXCELLENCE.**

Packed in kegs for general trade, or in 1 and 5 lb. boxes for hardware trade.

It will pay you to correspond with us.

MILTON MANUFACTURING CO.,

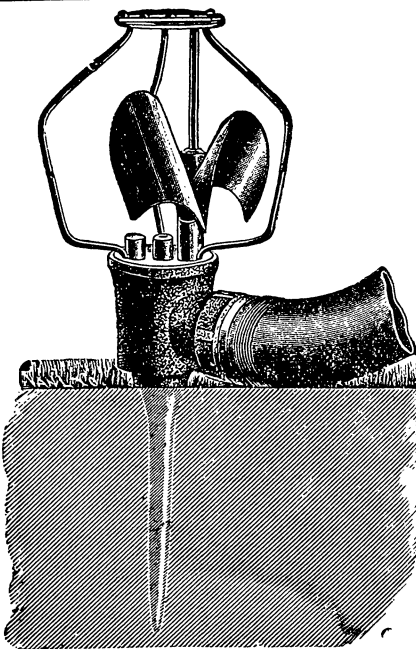
MILTON, PA.

# E. B. LANMAN, COLD PUNCHED NUTS

Columbus,  
Ohio.

All Standard Sizes, Regular or Odd, to Order.

In Kegs or Packages, convenient for JOBBERS.



## Here is something new. Have you seen it? BONNETTE'S ARC LAWN SPRINKLER.

Patented Oct. 20, 1891.

This Sprinkler was invented by a **DRY GOODS MAN** in Bay City, Mich. He noticed that when his neighbors set out their sprinklers, they wet all over the sidewalks as well as the lawns.

On going back and forth to the store he was often forced into the middle of the street to avoid a shower from the sprinkler. Ladies often ruined their dresses from this source.

It set him to thinking. Sprinklers should not be a nuisance. Could one be made that would sprinkle, if desired, in a half circle? He thought so. He commenced to work and experiment.

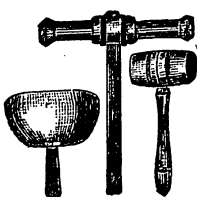
That was five years ago. It required lots of patience and there were many disappointments, but to-day,

### NOTE THE RESULT.

Five good reasons why this is the best sprinkler to buy:

1. It will not clog up.
  2. It will sprinkle a circle from 4 to 40 feet in diameter, according to the water pressure.
  3. It distributes the water equally over the entire surface, wasting none around the base of the machine.
  4. This is the only machine ever invented that will sprinkle water in a half-circle, thus preventing the wetting of walks while thoroughly sprinkling the lawn.
  5. It can be changed from a circle to a half-circle, or vice versa, in five seconds.
- We now claim to have the only perfect sprinkler in existence. It is simple, will not wear out nor clog up. Is well made and handsomely nicked, is boxed singly with full directions how to use. Its merits are, without question, pre-eminently superior to any other. Prices and samples sent upon application.

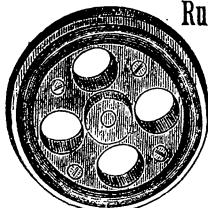
**BONNETTE ARC LAWN SPRINKLER CO., Bay City, Michigan.**



N. Y. MALLET AND HANDLE  
WORKS.

MANUFACTURERS OF  
**MALLETS.**  
Also Cotton and Bale  
Hooks.

Patented Feb. 13, 1877, a new  
combination of Hooks.  
456 E. HOUSTON ST.,  
New York City.



### Rubber and Iron Wheels

Casters for Trucks,  
Baskets and Boxes.

Heavy Casters for  
Mill use.

Catalogues free.  
H. P. CLARK, Box 0,  
Windsor Locks, Conn

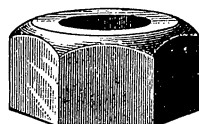
## AMERICAN BOLT COMPANY,

Manufacturers of  
**BOLTS AND NUTS, COACH OR LAG SCREWS.**  
Bridge Bolts, Car Bolts, Track Bolts, Washers, Chain Links, **BUILDING BOLTS**  
AND IRONS OF ALL KINDS, Forgings, Bolt and Nut Machinery, &c.

JAMES MINTER, President,

LOWELL, MASS.

MILES F. BRENNAN, Treasurer.



## PORTCHESTER BOLT & NUT CO.

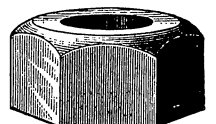
Port Chester, N. Y.

MANUFACTURERS OF

**BOLTS NUTS RIVETS and WASHERS**

CHAMFERED AND TRIMMED.

**SQUARE AND HEXAGON NUTS A SPECIALTY.**



WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

D. A. HUNT, AGENT.

**WM. H. HASKELL CO.,**  
—MANUFACTURERS OF—

**GIMLET POINT  
COACH SCREWS**

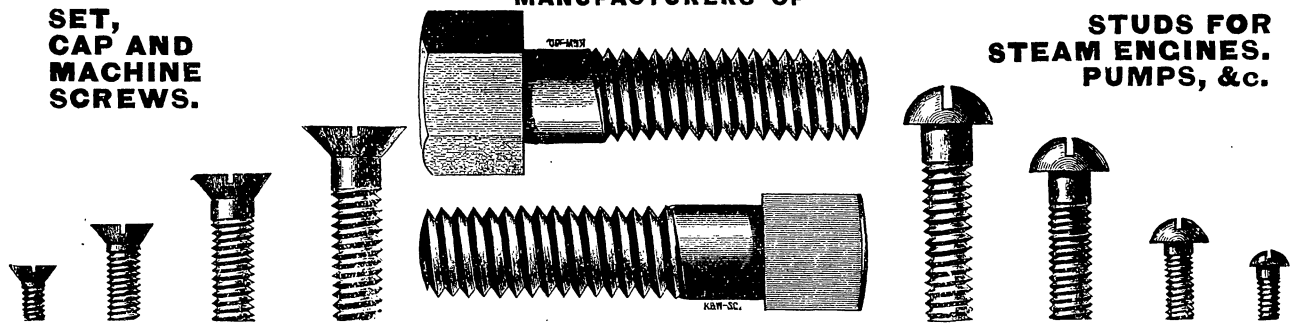
**Bolts, Cold-Punched  
Nuts and Washers,  
SUITABLE FOR MACHINERY  
OF ALL KINDS.**

Office and Works: 451 Main St., PAWTUCKET, R. I., U. S. A.

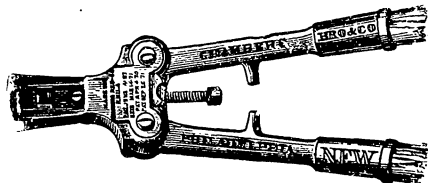
**HENRY B. NEWHALL CO., Agents,**  
105 CHAMBERS STREET, NEW YORK. - 47 PEARL STREET, BOSTON.

**WORCESTER MACHINE SCREW CO., Worcester, Mass.**

MANUFACTURERS OF

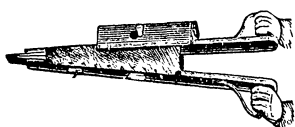
**EXPANSION BOLTS.**

For Fastening all Kinds of Structure to Brick and Stone Work.

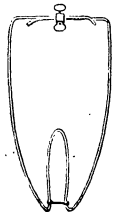
Patentee and M<sup>r</sup>, **ISAAC CHURCH,**  
Send for Catalogue. Toledo, O.**BOLT & RIVET CLIPPERS**

For cutting off the ends of Bolts and Rivets.

Liberal discounts to the trade.

**CHAMBERS BROTHERS COMPANY,**62d St., BELOW LANCASTER, AVE.,  
PHILADELPHIA, PA.**North-  
western  
Corn  
Planter.**Manufactured by **IRVING D. KING,**  
Send for circulars. ORLEANS, N. Y.**HARVARD TROUSERS STRETCHER.**

Patent Applied for.

Will restore pant legs to perfect shape,  
creased and pressed in the latest style,  
by allowing them to remain in over  
night. It exerts an outward pressure,  
and removes all wrinkles and bags at  
the knees.**(DIRECTIONS.)**Dampen the cloth after inserting the  
stretchers.

Made from steel wire, plated.

Price Per Pair, \$1.00.

Sample Pair to Dealers, 50c.

**GEO. H. GREGORY,**  
35 Arch Street, Boston, Mass.

**RIVETS**  
OF EVERY  
DESCRIPTION, FIRST QUALITY.

**W.P. TOWNSEND & CO.**  
NEW BRIGHTON, PA.

**ROUND HEAD**  
**FLAT HEAD**  
**STEEL HEAD**  
**COUNTERSUNK HEAD**  
**WAGON BOX HEAD**  
**CONE HEAD**  
**ROSE HEAD**  
**TRUSS HEAD**

5lb. 6lb. 7lb. 8lb. 10lb. 12lb.

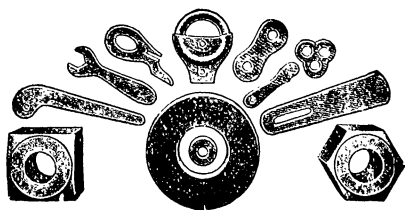
ESTABLISHED 1865.

**J. H. Sternbergh & Son,****READING  
PA.**MANUFACTURERS OF  
**BOLTS, NUTS, WASHERS, RIVETS,**

Including Machine Bolts, Carriage Bolts, Bridge Bolts and Car Bolts.

**THE HARVEY PATENT GRIP-THREAD TRACK BOLT,** 8-ft Steel Bolts with Cold Rolled  
Thread, Bolt Ends, Turnbuckles, Sleeve Nuts, Lag Screws, Set Screws and Tap Bolts and every variety of  
screwed work.**BOLTS, BRIDGE AND SHIP RIVETS,** Square and Hexagon Nuts of all kinds and sizes, Plate  
Washers, Belt Lacing Machines, Rods and Irons for Bridges and Buildings, Merchant Bar Iron, etc., etc.Branch Establishment, **THE KANSAS CITY BOLT & NUT CO.,** Kansas City, Mo.**J. FRED WILSON, Worcester, Mass.****Metal Punching AND Die Work.**Cold Punched Nuts and Washers  
for all Purposes.

SEND FOR PRICES ON

**SPECIALTIES IN LINE OF PRESS WORK**

# CLASSIFIED LIST OF ADVERTISERS.

## Air Chambers, Copper.

Emory, P. P. Mfg. Co., Springfield, Mass.  
Springfield Brass Co., Springfield, Mass.

## Air Compressors.

Norwalk Iron Works, S. Norwalk, Conn.  
Rand Drill Co., 25 Park Place, N. Y.

## Air Moving Machinery.

Howard & Morse, 45 Fulton, N. Y.

## Aluminum, Brass and Bronze.

Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.  
Gaylord, F. L. Co., Ansonia, Conn.  
Haight & Clark, Albany, N. Y.  
Pittsburgh Reduction Co., Pittsburgh, Pa.  
St. Louis Bronze & Aluminum Works, St. Louis, Mo.  
Scovill Mfg. Co., Waterbury, Conn.  
Waldo & Stout, Bridgeport, Conn.  
Illinois Pure Aluminum Co., Lemont, Ill.

## Analytical Chemists.

Britton, J. Blodgett, Philadelphia, Pa.  
Runt, Robt. W. & Co., Chicago, Ill.  
Moore, Dr. Gideon E., 221 Pearl St., N. Y.

## Anti-Friction Metals.—See Babbitt Metal

## Anvil and Vise (Combination).

Fulton Iron & Engine Works, Detroit, Mich.

## Anvils, Makers of.

Eagle Anvil Works, Trenton, N. J.  
Arms and Ammunition.

Forehand Arms Co., Worcester, Mass.  
Harrington & Richardson Arms Co., Worcester, Mass.

Hartley & Graham, 313 & 315 Broadway, New York.  
Stevens, J., Arms and Tool Co., Chicopee Falls, Mass.

Union Metallic Cartridge Co., 313 & 315 Broadway, N. Y.

## Auctioneers.

Haycock & Bissell, N. Y.

## Axes.

Peck, A. G. & Co., Cohoes, N. Y.

## Axle Grease.

Lovell, Tracy & Co., Hartford, Conn.

## Axles, Springs, &c., Makers of.

Bettendorf Hollow Steel Axle Works, Davenport, Ia.

Gaudier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Wurster, F. W., Brooklyn, N. Y.

## Babbitt Metal.

Crown Smelting Co., Chester, Pa.

Day Metal Co., St. Louis, Mo.

Eastwood Wire Mfg. Co., Bellville, N. J.

Keys, W. W. & R. M. Co., Bridgeport, Conn.

Reeves, Paul S., Philadelphia, Pa.

Shaw, Luther & Son, Worcester, Mass.

Bakers and Roasters.

Bronson Supply Co., Cleveland, Ohio.

## Bale Ties.

Kilmer Mfg. Co., Newburg, N. Y.

## Band Saws.

Atkins, E. C. & Co., Indianapolis, Ind.

## Barb Wire and Fence.

Consolidated Steel & Wire Co., St. Louis, Mo.

Gaudier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Indiana Wire Fence Co., Crawfordsville, Ind.

Kilmer Mfg. Co., Newburg, N. Y.

Ludlow-Saylor Wire Co., St. Louis, Mo.

Washburn & Moen Mfg. Co., Worcester, Mass.

## Bar Iron, Manufacturers of.

Stens Iron Works, Bridgeport, O.

Allentown Rolling Mills, Allentown, Pa.

Burden Iron Co., Troy, N. Y.

Montour Iron & Steel Co., Danville, Pa.

Mahoning Valley Iron Co., Youngstown, Ohio.

Starbuck, J. R. & Son, Reading, Pa.

## Bellows, Makers of.

Bullock Bellows Co., Cleveland, O.

South, Geo. M., Chicago, Ill.

## Bells.

Bevin Bros. Mfg. Co., East Hampton, N. Y.

## Belt Dressing.

Joe Dixon Crucible Co., Jersey City, N. J.

## Belt Fasteners.

Bristols' Mfg. Co., Waterbury, Conn.

Claden Mfg. Co., Cleveland, Ohio.

Talcott, W. O., Providence, R. I.

## Belting, Makers of.

Alexander Bros., 412 N. 3d, Phila.

Jeffrey Mfg. Co., Columbus, O.

Link-Belt Engineering Co., Phila., Pa.

Main Belting Co., Philadelphia, Pa.

N. Y. Belting & Packing Co., Ltd., N. Y.

Roberts Mfg. Co., Pittsburgh, Pa.

Shultz Belting Co., St. Louis, Mo.

## Bicycles.

Bigwell, Geo. R. Cycle Co., 310 W. 50th Street, N. Y.

Bingham, W. C., Cleveland, Ohio.

Common Sense Bicycle Mfg. Co., Phila.

Coventry Machine Co., Ltd., Boston, Mass.

Hulbert Bros. & Co., 28 W. 23d St., N. Y.

Lovell, Jno. P. Arms Co., Boston, Mass.

Marble Cycle Mfg. Co., Plymouth, Ind.

Monarch Cycle Co., Chicago, Ill.

Pope Mfg. Co., Boston, Mass.

Read, Wm. & Sons, Boston, Mass.

Rouse, Hazard & Co., Peoria, Ill.

Western Wheel Works, Chicago, Ill.

Bird Cages.

Pierce, Geo. N. & Co., Buffalo, N. Y.

Bits and Braces.

Am. Bit Brace & Co., Buffalo, N. Y.

Backus Mfg. Co., Williamsport, Pa.

Bridgeport Gun Implement Co., 313-315 Broadway, N. Y.

Jennings, O. E. & Co., 97 Chambers, N. Y.

Blocks, Tackle, Makers of.

Boston & Lockport Block Co., Boston, Mass.

and Lockport, N. Y.

Cleveland Block Co., Cleveland, O.

Fulton Iron & Engine Works, Detroit, Mich.

Shubert & Cottingham, Philadelphia, Pa.

Toledo Block Works, Toledo, O.

## Blowers.

Buffalo Forge Co., Buffalo, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Huyett & Smith Mfg. Co., Detroit, Mich.

Sturtevant, B. F. & Co., Boston, Mass.

## Boiler Makers' Rolls.

New Doty Mfg. Co., Janesville, Wis.

## Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.

Mellvain, Wm. & Sons, Reading, Pa.

Lukens Iron & Steel Co., Coatsville, O.

Pottstown Iron Co., Pottstown, Pa.

## Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

## Boilers, Steam.

Babcock & Wilcox Co., 30 Cortlandt, Edge Moor Iron Co., Wilmington.

Harrison Safety Boiler Wks., Phila., Pa.

Kendall, Edw. & Son, Cambridgeport, Mass.

Pollock, W. B. & Co., Youngstown, O.

Southward Fdy. & Mch. Co., Phila., Pa.

Wetherill, Robt. & Co., Chester, Pa.

## Bolt Cutters.

Chambers Bros. Co., Philadelphia.

Howard Iron Works, Buffalo, N. Y.

Porter, H. K., Boston, Mass.

Wells Bros. Co., Greenfield, Mass.

Wiley & Russell Mfg. Co., Greenfield, Mass.

## Books.

Lamberson, B., Portland, Ore.

Williams, David, 98-102 Reade, N. Y.

Wolcott & West, Syracuse, N. Y.

## Boring Machines.

Buckeye Mfg. Co., Union City, Ind.

## Box Bander.

Goodell & Harding, Burlington, Vt.

Boxes, Hdw. Shell, &c.

Green, A. H., 22 Park Place, N. Y.

Jones, Jesse & Co., Philadelphia, Pa.

## Box Straps and Corners.

Buffalo Specialty Mfg. Co., Buffalo, N. Y.

## Brake Shoes.

Condon Brake Shoe Co., Chicago, Ill.

## Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.

Davol, John & Sons, 100 John, N. Y.

Holmes, Booth & Haydens, N. Y.

Plume & Atwood Mfg. Co., N. Y.

Randolph & Clowes, Waterbury, Conn.

Rome Brass and Copper Wks., Rome, N. Y.

Scovill Mfg. Co., Waterbury, Conn.

Waterbury Brass Co., 296 B'way, N. Y.

## Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers, N. Y.

## Brass Foundries.

Cramp, Wm. & Sons, S & E. B. Co., Philadelphia, Pa.

Emory, P. P. Mfg. Co., Springfield, Mass.

Haight & Clark, Albany, N. Y.

Keys, W. W. & R. M. Co., Bridgeport, Conn.

North Bros. Mfg. Co., Phila., Pa.

Reeves, Paul S., Philadelphia, Pa.

Shaw, Luther & Son, Worcester, Mass.

## Brass Goods.

Brass Goods Mfg. Co., 88 Chambers, Bridge Builders.

Berlin Iron Bridge Co., East Berlin, Ct.

Booth & Edge Works, Boston, Mass.

Wrought Iron Bridge Co., Canton, O.

## Bronze (Tobin).

Ansonia Brass & Copper Co., 19-23 Cliff Street, N. Y.

## Brooms and Brushes.

Cincinnati Mfg. Co., Cinn., Ohio.

Lay, Jos. & Co., Ridgeville, Ind.

Butchers' Hardware.

Deltz, A. E., 97 Chambers St., N. Y.

Reading Hdw. Co., Reading, Pa.

Warner Lock Co., Chicago, Ill.

Yale & Towne Mfg. Co., Stamford, Ct.

## Butcher and Shoe Knives, Manufacturers of.

Goodell Co., Antrim, N. H.

Wilson, John, Sheffield, England.

McKinney Mfg. Co., Allegheny, Pa.

Sabin Machine Co., Montpelier, Vt.

Stanley Works, New Britain, Conn.

Tiebout, W. & J., 16 Chambers, N. Y.

Cabinet Makers' Bench.

Grand Rapids Hand Screw Co., Grand Rapids, Mich.

## Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.

Starrett, L. S., Athol, Mass.

## Can Openers.

Meisselbach, A. F. & Bro., Newark, N. J.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Hillebrand & Wolf, Philadelphia, Pa.

Car Wheels.

Whitney, A. & Sons, Phila.

Carriage Hardware, Makers of.

Cover's Saddlery Works, Farmer, N. Y.

Eccles, Richard, Auburn, N. Y.

McKinnon Dash & Hdw. Co., Ltd., Buffalo, N. Y.

Scranton Forging Co., Scranton, Pa.

Smith, H. & Co., Plantville, Conn.

Wilcox & Howe Co., Birmingham, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Casters, Wheel, &c.

Clark, G. P., Windsor Locks, Conn.

Gwinner Mfg. Co., Hamilton, O.

Tucker & Dorsey Mfg. Co., Indianapolis, Ind.

Castings, Iron and Steel.

Ames Sword Co., Chicopee, Mass.

Arcade Malleable Iron Co., Worcester, Mass.

Aschman Steel Casting Co., Tharlow, Pa.

Booth, The Lloyd, Co., Youngstown, O.

The Burr & Houston Co., Brooklyn, N. Y.

Cambria Steel-Cambria Iron Co., Johnstown, Pa.

Cheney, S. & Son, Manlius, N. Y.

## Chester Steel Casting Co., Phila.

Chrome Steel Works, Brooklyn, N. Y.

Congdon Brake Shoe Co., Chicago, Ill.

Etts & Henger Mfg. Co., St. Louis, Mo.

Eureka Cast Steel Co., Chester, Pa.

Flagg, Stanley G. & Co., Phila.

Haight & Clark, Albany, N. Y.

Hammer & Co., Branford, Conn.

Herriock, J. A., 234 Pearl St., N. Y.

Johnson Foundry Co., Johnstown, Pa.

Johnson, I. G. & Co., Spuyten Duyvil, Mahoning Fdry. & Mch. Co., Danville, Pa.

New Castle Steel Casting Co., New Castle, Pa.

Norristown Steel Co., Norristown, Pa.

Northwest Malleable Iron Co., Milwaukee, Wis.

Palmer & De Mooy, Cleveland, O.

Passaic Art Casting Co., Passaic, N. J.

Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.

Pratt & Letchworth, Buffalo, N. Y.

Sessions Foundry Co., Bristol, Conn.

Shenard Hdw. Co., Buffalo, N. Y.

Shickel, Harrison & Howard Iron Co., St. Louis, Mo.

Shilling Fdry. Co., Columbus, O.

Spencer's, I. S., Sons, Guilford, Conn.

Standard Fdy. & Mfg. Co., Cleveland, O.

Standard Steel Casting Co., Tharlow, Pa.

Syracuse Steel Foundry, Syracuse, N. Y.

Taylor Iron & Steel Co., High Bridge, N. J.

Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.

Trorton Mel. Iron Co., Trenton, N. J.

Union Mfg. Co., 103 Chambers St., N. Y.

Wetherill, Robt. & Co., Chester, Pa.

- Northampton Emery Wheel Co. Leeds, Mass.
- Norton Emery Wheel Co., Worcester, Mass.
- Springfield Emery Wheel Mfg. Co., Springfield, Conn.
- Waltham Emery Wheel Co., Waltham, Mass.
- Enamels.**
- Nubian Iron Enamel Co., Cragin Ill.
- Engineers and Contractors.**
- Alken Henry, Pittsburgh, Pa.
- Artificial Gas Engineering Co., Pittsburgh, Pa.
- Brady Mfg. Co., Brooklyn, N. Y.
- Carlson, Henry J., Pittsburgh, Pa.
- Christie, W. Wallace, Paterson, N. Y.
- Curtis, Gram, Pittsburgh, Pa.
- Herrick, J. A., 284 Pearl St., N. Y.
- Kennedy, Julian, Pittsburgh, Pa.
- Laughlin, Alex. & Co., Pittsburgh, Pa.
- Lean, D. R., Co., Pittsburgh, Pa.
- McClure, Amster & Co., Pittsburgh, Pa.
- Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
- Roberts, Frank C., Philadelphia, Pa.
- Smythe, S. R. Co., Incorporated Pittsburg, Pa.
- Swindell, W. & Bros., Pittsburgh, Pa.
- Wilkie, Bothwell & Co., Ltd., Pittsburgh, Pa.
- Engines, Gas.**
- Otto Gas Engine Works, Phila., Pa.
- Engines, Steam.**
- Cleveland & Harwick, Erie, Pa.
- Harrisburg Fdy. & Machine Works, Harrisburg, Pa.
- Lane & Bradley Co., Cincinnati, O.
- Norwalk Iron Works Co., So. Norwalk, Conn.
- Shipman Engine Co., Boston, Mass.
- Southwark Foundry and Machine Co., Phila., Pa.
- Tod, William & Co., Youngstown, O.
- Wetherill, Robt. & Co., Chester, Pa.
- Exhaust Tumblers.**
- Sweester, W. A., Brockton, Mass.
- Expansion Belts.**
- Boone, W. C. & Son, Brooklyn, N. Y.
- Church, Isaac, Toledo, O.
- Faucets.**
- Lane Bros., Poughkeepsie, N. Y.
- Faucets, Wooden.**
- Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.
- John Sommer's Son, Newark, N. J.
- Feed-Water Heaters.**
- Berryman Jas., Philadelphia, Pa.
- Davis, I. B. & Son, Hartford, Conn.
- Goubert Mfg. Co., 32 Cortlandt St., N. Y.
- Harrison Safety Boiler Wks. Phila., Pa.
- National Pipe Bending Co., New Haven, Conn.
- Webster, Warren & Co., Phila., Pa.
- Whitlock Coil Pipe Co., Elmwood, Conn.
- Fencing, Iron and Wire.**
- Barnum, E. T., Detroit, Mich.
- Champion Iron Co., Kenton, O.
- Clinton Wire Cloth Co., Clinton, Mass.
- DeKalb Fence Co., Philadelphia, Pa.
- Gilbert & Bennett Mfg. Co., 42 Cliff St., Phila.
- Hartman Mfg. Co., Beaver Falls, Pa.
- Kilmer Mfg. Co., Newburgh, N. Y.
- Mast, Foss & Co., Springfield, O.
- The Van Dorn Iron Works Co., Cleveland, O.
- Reliance Wire Works Co., Milwaukee, Wis.
- Files, Importers or**
- Moss, F. W., 80 John, N. Y.
- Files and Raps, Manufacturers of**
- Barnett, G. & H., 41 & 43 Richmond Phila.
- Butcher, W. & S., 135 Duane St., N. Y.
- McCaffrey File Co., Philadelphia, Pa.
- Nicholson File Co., Providence R. I.
- Fire Brick, Makers of**
- Borgner, Cyrus, Philadelphia, Pa.
- Gardner, Jas. & Son, Cumberland, Md.
- Kreischer B. & Sons, foot E. Houston, St. Maurer, H. & Son, 420 E. 28d, N. Y.
- Renovo Fire Brick and Clay Co., Phila.
- Ostrandere Fire Brick Co., Troy, N. Y.
- Presbrey Stove Lining Co., Taunton, Mass.
- Valentine, M. D. & Bro., Woodbridge.
- Fire Sets.**
- Troy Mfg. Works, Troy, N. Y.
- Fishing Tackle.**
- Dame, Stoddard & Kendall, Boston, Mass.
- Enterprise Mfg. Co., Akron, O.
- Flint and Emery Paper.**
- Baeder, Adamson & Co., Phila., Pa.
- Flour Sifters.**
- Meyers, F. J. Mfg. Co., Covington, Ky.
- Fodder Cutters.**
- Silver Mfg. Co., Salem, O.
- Forges, Portable, &c.**
- Bradley & Co., Syracuse, N. Y.
- Buffalo Bellows Co., Cleveland, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Champion Blower & Forge Co., Lancaster, Pa.
- Empire Portable Forge Co., Lansingburg, N. Y.
- Foss Mfg. Co., Springfield, Ohio.
- Sturtevant, B. & Co., Boston, Mass.
- Forgings, Iron and Steel.**
- Bethlehem Iron Co., S. Bethlehem, Pa.
- Cambria Steel-Cambria Iron Co., Johnstown, Pa.
- Seranton Forging Co., Seranton, Pa.
- Foundry Facings.**
- Chicago Fdy. Supply Co., Chicago, Ill.
- MacKellar Foundry Facing & Supply Co., Quincy, Ill.
- Paxson, J. W. & Co., Phila.
- S. Obermayer Co., Cincinnati, O.
- Smith, J. D. Fdy. Supply Co., Cin., O.
- Whitehead Bros. Co., 617 W. 15th St., Quincy, Ill.
- Foundry Riddles.**
- Eatey, W. S., 65 Fulton, N. Y.
- Foundry Supplies.**
- Chicago Fdy. Supply Co., Chicago, Ill.
- Collins, Victor, Detroit, Mich.
- MacKellar Fdy. Facing & Supply Co., Quincy, Ill.
- S. Obermayer Co., Cincinnati, O.
- Paxson, J. W. & Co., Philadelphia.
- Smith, J. D. Fdy. Supply Co., Cin., O.
- Whitehead Bros. Co., 617 W. 15th St., Quincy, Ill.
- Friction Clutches.**
- Moore & White Co., Philadelphia, Pa.
- Frut Presses.**
- Enterprise Mfg. Co., Philadelphia, Pa.
- Fuel Burners.**
- Collins, W. S., 45 Drexel Bldg., N. Y.
- Furnaces, Foundry.**
- Byram & Co., Detroit, Mich.
- Furnaces, Gasoline.**
- Burgess Soldering Furnace Co., Columbus, Ohio.
- Garden Tools.**
- Noyes, B. B. & Co., Greenfield, Mass.
- Gas Producers.**
- Wood, R. D. & Co., Philadelphia, Pa.
- Gas & Steam Fitters' Supplies.**
- Pancoast & Maulo, Phila., Pa.
- Gear Cutters.**
- T. E. Whitton Mach. Co., New London, Conn.
- Gears.**
- Boston Gear Works Boston Mass.
- New Process Raw Hide Co., Syracuse, N. Y.
- Poole, Robt. & Son Co., Baltimore, Md.
- Union Fdy. & Mch. Co., Pittsburgh, Pa.
- Glass Boards.**
- Canton Saw Co., Canton, O.
- Glass Tubes.**
- Ashcroft Mfg. Co., 111 Liberty St., N. Y.
- Glass Cutters.**
- Monroe, S. G., Bristol, Conn.
- Graze.**
- Adamson & Co., Phila., Pa.
- Improved Process Glue Co., Gloucester Mass.
- Gruasia Cement Co., Gloucester, Mass.**
- Grass Catchers.**
- Glennon & Krause, Chicago, Ill.
- Grinding Mills.**
- Grinding Mfg. Co., Springfield, O.
- Grinding and Polishing Machines.**
- Diamond Mch. Co., Providence, R. I.
- Herrick & Cowell, New Haven, Conn.
- Norton Emery Wheel Co., Worcester, Mass.
- Washburn Shops, Worcester, Mass.
- Grinding Dressing Machinery.**
- Blake & Johnson, Waterbury, Conn.
- Grindstones.**
- Cleveland Stone Co., Cleveland, O.
- Huron Grindstone Co., Port Austin, Mich.
- Gum Implements.**
- Union Hdw. Co., Torrington, Conn.
- Gunpowder, Makers of**
- Lafin & Rand Powder Co., N. Y.
- Hand Carts.**
- Lansing Wheelbarrow Co., Lansing, Mich.
- Hand Screws.**
- Grand Rapids Hand Screw Co., Grand Rapids, Mich.
- Handles.**
- New Process Raw Hide Co., Syracuse, N. Y.
- New York Mallet and Handle Wks., 45 E. Houston St., N. Y.
- Hangers.**
- Chicago Spring Butt Co., Chicago, Ill.
- Cronk Hanger Co., Elmira, N. Y.
- Lane Bros., Poughkeepsie, N. Y.
- Victor Mfg. Co., Newburyport, Mass.
- Hardware Comm'n Merchants.**
- Baker, Martin, 88 Chambers, N. Y.
- Jacobus, W. J., Chambers, N. Y.
- Hardware Manufacturers.**
- Hotchkiss, E. S., Bridgeport, Conn.
- Stearns, E. C. & Co., Syracuse, N. Y.
- Union Mfg. Co., 103 Chambers, N. Y.
- Yale & Towne Mfg. Co., Stamford, Conn.
- Hardware Mfrs. Agents.**
- Bingham, W. Co., Cleveland, O.
- Graham, John H. & Co., 113 Chambers, McCoy, Jos. F. Co., 26 Warren St., N. Y.
- Sickles, Sweet & Lyon, 35 Barclay, N. Y.
- Surplus, Dunn & Alder, 97 Chambers, New York.
- Underhill, Clinch & Co., 94 Chambers St., N. Y.
- Hardware Specialties.**
- Aome Shear Co., Bridgeport, Conn.
- Bailey, F. E. & Co., Chicago, Ill.
- Heiden Machine Co., New Haven, Conn.
- Clark Mfg. Co., Buffalo, N. Y.
- Clark & Brady, Co., Cleveland, O.
- Empire Portable Forge Co., Lansingburg, N. Y.
- Enterprise Mfg. Co., Philadelphia, Pa.
- Ette & Henger Mfg. Co., St. Louis, Mo.
- Gwinner Mfg. Co., Hamilton, O.
- Hart, H. C. Mfg. Co., Detroit, Mich.
- Henn, A. S. & Co., New Haven, Conn.
- Home Novelty Mfg. Co., St. Louis.
- North Bros. Mfg. Co., Philadelphia, Pa.
- Welland, Chas., 113 Chambers St., N. Y.
- Wire Goods Co., Worcester, Mass.
- Underhill, Clinch & Co., 94 Chambers Street, N. Y.
- Heavy Ware, Yacht and Ship.**
- Ferdinand, L. W. & Co., Boston, Mass.
- Harvest Snaps.**
- Covert Mfg. Co., West Troy, N. Y.
- Cover's Saddlery Wks., Farmer, N. Y.
- Pitch, W. & E. T. New Haven, Conn.
- Hat and Coat Hooks.**
- Murphy Hat Rest Co., St. Louis, Mo.
- Haw & Nivver.**
- Holt, Hiram, Co., E. Wilton, Me.
- Heat Deflector.**
- Heat Deflector Co., Cosmubus, O.
- Hitching Post.**
- Detrick, M. H., Sterling, Ill.
- Hoisting Machines.**
- Box, Alfred & Co., 314 Green, Phila.
- Jrow Hoisting & Conveying Mch. Co., Cleveland, Ohio.
- Fulton Iron & Engine Wks., Detroit, Mich.
- Harrington, E. & Son & Co., Phila.
- Lane Bros., Poughkeepsie, N. Y.
- Lingerwood Mfg. Co., 96 Liberty, N. Y.
- Miles & Beckley, Philadelphia.
- Moore Mfg. & Fdy. Co., Milwaukee, Wis.
- Hollow Ware.**
- Bronson Supply Co., Cleveland, Ohio.
- Morse, Williams & Co., Phila.
- Sellers, Wm. & Co., Phila. and N. Y.
- Speidel, J. G., Reading, Pa.
- Yale & Towne Mfg. Co., Stamford, Ct.
- Cleveland Stamping & Tool Co., Cleveland, O.
- Stuart & Peterson Co., Phila., Pa.
- Hollowware, Aluminum.**
- Illinois Pure Aluminum Co., Lemont, Ill.
- Horse and Barbers' Clippers.**
- Hotchkiss, E. S., Bridgeport, Conn.
- Horse Nail, Makers of**
- Ausable Horse Nail Co., Warren, N. Y.
- National Horse Nail Co., Vergennes, Vt.
- Horse Shoes, Makers of**
- Bryden Horse Shoe Co., Catasaugus, Pa.
- Burden Iron Co., Troy, N. Y.
- Diamond State Iron Co., Wilmington, Del.**
- Old Dominion Iron & Nail Works Co., Richmond, Va.
- Phoebe Horse Shoe Co., Poughkeepsie, N. Y.
- Rhode Island Perkins Horse Shoe Co., Providence.
- Standard Horse Shoe Co., Boston, Mass.
- The Burden Iron Co., Troy, N. Y.
- Hose.**
- N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.
- Hose Menders.**
- Hudson, C. E. & Co., Leominster, Mass.
- Hotels.**
- The Audubon, Chicago, Ill.
- Hydrants, &c.**
- McLean, John, 296 & 298 Monroe, N. Y.
- Hydraulic Jacks.**
- Dudgeon, Richard, Columbia, N. Y.
- Watson & Stillman, 204 E. 43d, N. Y.
- Ice-Cream Freezers.**
- North Bros. Mfg. Co., Phila., Pa.
- Packer, C. W., Philadelphia, Pa.
- Shard Hdw. Co., Buffalo, N. Y.
- White Mountain Freezer Co., Nashua, N. H.
- Ice Shavers.**
- Enterprise Mfg. Co., Philadelphia, Pa.
- Injectors.**
- Jenkins Bros., New York.
- Shawmut Mfg. Co., Buffalo, N. Y.
- Insurance, Boiler.**
- Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.
- Iron and Steel, Sweden.**
- Lundberg, Gustaf, Boston, Mass.
- Miles, A. & Co., Broadway, N. Y.
- Parker, J. W. & Co., Philadelphia.
- Iron Commission Brokers.**
- Corning, Edw. & Co., 29 B'way, N. Y.
- Cotton, Bradley & Co., Philadelphia.
- Etting, Edw. J., Philadelphia.
- Hogan, John L. & Co., Philadelphia, Pa.
- Hoffman, J. W. & Co., Philadelphia.
- Levis, Henry & Co., Philadelphia.
- Kesley, Jerome & Co., Philadelphia.
- Lee, J. Tatnall & Co., Philadelphia.
- Mohr, J. J., 430 Walnut, Philadelphia.
- Mann, E. R. & Co., Philadelphia.
- Phillips & Crane, Philadelphia, Pa.
- Shelton, Geo. H. & Co., Chicago, Ill.
- Wilhelm & Co., Harrisburg, Pa.
- Wister, L. & R. Co., Phila., Pa.
- Iron Ore.**
- Naylor & Co., 45 Wall, N. Y.
- Pickards, Brown & Co., Chicago, Ill.
- Pullman, J. Wesley, Phila., Pa.
- Samuel, Frank, Philadelphia, Pa.
- Iron, Merchants.**
- Barnes, C. K. & Co., Philadelphia, Pa.
- Borden & Lovell, 70 West, N. Y.
- Bussenius & Cumfrie, Philadelphia.
- Corning Edw. & Co., 29 B'way, N. Y.
- Cotton, Bradley & Co., Philadelphia.
- Cotton, Bradley & Co., Philadelphia.
- Hoffman, J. W. & Co., Philadelphia.
- Leonard, J., 440 West St., N. Y.
- Naylor & Co., 45 Wall St., N. Y.
- Nicolls, Wheeler & Co., Philadelphia.
- Ogden & Wallace, 85 Elm St., N. Y.
- Park, Jewell & Co., Boston, Mass.
- Pickards, Brown & Co., Chicago, Ill.
- Pierston & Co., 24-27 West, N. Y.
- Richards, D. W. & Co., 88 Mangin St., N. Y.
- Wallace, Wm. H. & Co., Albany & Washington streets, N. Y.
- Wilner, J. R. & Co., 17 B'way, N. Y.
- Wilson, J. R. & Co., Philadelphia.
- Iron, Importers.**
- Abbott, Jere & Co., N. Y. and Boston.
- Lundberg, Gustaf, Boston, Mass.
- Iron, Sheet, Manufacturers of.**
- Etna Iron & Steel Co., Bridgeport, O.
- Cambridge Iron & Steel Co., Cambridge, Ohio.
- Wheeling Steel & Iron Co., Wheeling, W. Va.
- W. Dewees Wood Co., Lim., McKeesport, Pa.
- Ironwork, Ornamental.**
- Barnum, E. T., Detroit, Mich.
- Champion Iron Co., Kenton, O.
- Ludlow-Saylor Wire Co., St. Louis, Mo.
- Mast, Foss & Co., Springfield, O.
- The Van Dorn Iron Works Co., Cleveland, O.
- Joist Leveler.**
- Columbia Mfg. Co., Cincinnati, O.
- Knives.**
- Wollensak, J. F., Chicago, Ill.
- Ladders.**
- Davies, Chas. & Co., Williamsport, Pa.
- Ladies.**
- Detroit Fdy. Equipment Co., Detroit, Mich.
- Lawn Mowers.**
- Lansing Foundry Co., Cleveland, O.
- Lamps.**
- Standard Lighting Co., Cleveland, O.
- Lanterns.**
- Dietz, R. E. & Co., 60 Lighth St., N. Y.
- Steam Gauge & Lantern Co., Syracuse, N. Y.
- Lathes.**
- Millers Falls Co., 98 Reade, N. Y.
- Sebastian Lathe Co., Cincinnati, O.
- Sebastian, May & Co., Sidney, O.
- Seneea Falls Mfg. Co., Seneea Falls, N. Y.
- Lathing, Wire.**
- Lathing Wire Cloth Co., Clinton, Mass.
- N. J. Wire Cloth Co., Trenton, N. J.
- Wright & Colton Wire Cloth Co., Worcester, Mass.
- Lawn Mattedoes.**
- Railway Speed Recorder Co., Kent, O.
- Lawn Mowers.**
- Binham, W. Co., Cleveland, O.
- Blair Mfg. Co., Springfield, Mass.
- Chadborn & Coldwell Mfg. Co., Newburg, N. Y.
- Champion Mfg. Co., Richmond, Ind.
- Coldwell Lawn Mower Co., Newburg, N. Y.
- F. & N. Mfg. Co., Richmond, Ind.
- Graham, Passmore & Co., Phila., Pa.
- Henley, M. C., Richmond, Ind.
- Lape, W. E., Syracuse, N. Y.
- Mast, Foss & Co., Springfield, O.
- Stearns, E. C. & Co., Syracuse, N. Y.
- Surplus, Dunn & Alder, 97 Chambers St., N. Y.
- Wilsn Whiteley & Co., Springfield, O.
- Lawn Rakes.**
- Gibbs Mfg. Co., Canton, O.
- Graham, John H. & Co., 111 Chambers St., New York.
- Schaeffer & Co., Dayton, Ohio.
- Lawn Sprinklers.**
- Blair Mfg. Co., Springfield, Mass.
- Bonnette Arc Lawn Sprinkler Co., Bay City, Mich.
- Ette & Henger Mfg. Co., St. Louis.
- McGowan, John H. Co., Cincinnati, O.
- Lawn Sweepers.**
- Lape, W. E., Syracuse, N. Y.
- Lawn Swings.**
- Davies, Chas. & Co., Williamsport, Pa.
- Lemon Squeezers.**
- Ripley Mfg. Co., Unionville, Conn.
- Letter Boxes.**
- Merriam Mfg. Co., Durham, Conn.
- Letters, Paper.**
- Tablet & Ticket Co., Chicago, Ill.
- Levels.**
- D. V. & Cook, Watertown, N. Y.
- Richardson, C. F. & Son Athol, Mass.
- Locks & Knobs, Manufacturers of.**
- Deitz, A. E., 97 Chambers, N. Y.
- Reading Hdw. Co., Reading, Pa.
- Sargent & Co., 37 Chambers, N. Y.
- Smith & Egge Mfg. Co., Bridgeport, Vt.
- Warner Lock Co., Chicago, Ill.
- Yale & Towne Mfg. Co., Stamford, Conn.
- Lubricators.**
- Lunkenheimer Co., Cincinnati, Ohio.
- Wadhams Oil & Grease Co., Milwaukee, Wis.
- Machinery.**
- Am. Tool Works, Cleveland, Ohio.
- Anthractic Brass Wks., Tamaqua, Pa.
- Barnes, W. F. & John, Rockford, Ill.
- Becker, Jno. Mfg. Co., Fitchburg, Mass.
- Bement, Miles & Co., Philadelphia, Pa.
- Bertsch & Co., Cambridge City, Ind.
- Biselow, C. E. & Son, N. Y.
- Bisnall & Keeler Mfg. Co., St. Louis.
- Birmingham Iron Foundry, Birmingham, Conn.
- Bliss, E. W. Co., Brooklyn, N. Y.
- Bogert, Jno. L., Klusung, N. Y.
- Briggs, Marvin, 12 Broadway, N. Y.
- Brown & Sharpe Mfg. Co., Providence, R. I.
- Carlin's Sons, Thos., Allegheny, Pa.
- Cinn. Milling Mch. Co., Cincinnati, Ohio.
- Clapp, Geo. M., agt., 74 Cortlandt, N. Y.
- Coulter & McKenzie Mch. Co., Bridgeport, Conn.
- Cruikshank, D. B., Providence, R. I.
- Davis, W. P., Rochester, N. Y.
- Detrick & Harvey Mch. Co., Baltimore, Md.
- Fitchburg Mch. Works, Fitchburg, Mass.
- Garvin Mch. Co., Lighthouse & Canal Sts.
- Gould & Eberhardt, Newark, N. J.
- Harrington, E. & Son & Co., Phila., Pa.
- Henderson Machine Tool Co., Phila., Pa.
- Hendey Machine Co., Torrington, Ct.
- Henley Mch. Tool Wks., Richmond, Ind.
- Hill, Clarke & Co., Boston, Mass.
- Ingersoll Milling Machine Co., Rockford, Ill.
- Johnson, Israel H., Jr., & Co., Phila.
- Jones & Lamson Mch. Co., Springfield, Vt.
- Lodge & Davis Mch. Tool Co., Cincinnati, O.
- Lodge & Shipley Mch. Tool Works, Cincinnati, O.
- Lovegrove & Co., Philadelphia, Pa.
- McCabe, J. J., 68 Cortlandt, N. Y.
- Machineists Supply Co., Rochester, N. Y.
- Manville, E. J. Mch. Co., Waterbury, Conn.
- National Machinery Co., Timon, Ohio.
- Newark Mon. Tool Works, New ark, N. J.
- New Haven Mfg. Co., New Haven, Conn.
- New York Mach'n'y Depot, N. Y.
- Niles Tool Wks., 138 Liberty St., N. Y.
- Pittsburgh Mfg. Co., Pittsburgh, Pa.
- Place, Geo., 120 Broadway, N. Y.
- Poole, Robt. & Son Co., Baltimore, Md.
- Powell Planer Co., Worcester, Mass.
- Pratt & Whitney Co., Hartford, Conn.
- Prentiss Tool & Supply Co., N. Y.
- Seranton Supply & Mchry. Co., Seranton, Pa.
- Sellers, Wm. & Co., Phila.
- Seyfert's Sons L. F., Philadelphia, Pa.
- Stephens, J. & Co., Cincinnati, O.
- Stow Flexible Shaft Co., L. O., Phila.
- Tommer, Frank, Philadelphia, Pa.
- Wetherill, Robert & Co., Chester, Pa.
- Wilson, W. A., Rochester, N. Y.
- Woodruff Mfg. Co., Hartford, Conn.
- Machinery for Hardware Manufacture.**
- Act, Jno. & Son, New Haven, Conn.
- Machine Knives.**
- Loring Coe & Co., Worcester, Mass.
- Loyd, John, 558-562 Water St., N. Y.
- Machine Tools.—See Machinery, Machine Work.**
- Angus, C. H., Albany, N. Y.
- Machinists' Seates.**
- Coffin & Leighton, Syracuse, N. Y.
- Starrett, L. S., Athol, Mass.
- Machinists' Tools and Supplies.**
- Brown & Sharpe Mfg. Co., Providence, R. I.
- King, J. M. & Co., Waterford, N. Y.
- Sellers, Wm. & Co., Inc., Phila.
- Mallets.**
- N. Y. Mallet & Handle Works, N. Y.
- Mangers.**
- Wortley's Broad Gauge Iron Stall Works, Boston, Mass.
- Manufacturing Sites.**
- Illinois Central R. Co., Chicago, Ill.
- Measuring Tapes.**
- Lutkin Rule Co., Saginaw, Mich.
- Meat Cutters.**
- Enterprise Mfg. Co., Philadelphia, Pa.
- Metals.**
- Fearing, Wm. S., 100 Chambers, N. Y.
- Hendricks Bros., 49 Cliff, N. Y.
- Naylor & Co., 45 Wall, N. Y.
- Metal Brokers.**
- American Metal Co., N. Y.
- Metallurgists.**
- Britton, J. Blodgett, Phila.
- Metal Saws.**
- Ehrhardt, Gastave & Sons, Pittsburgh & C. Co., Chicago, Ill.
- Milling Machines.**
- Brown & Sharp, Providence, R. I.
- Cinn. Milling Mch. Co., Cincinnati, Ohio.
- Clough, R. M., Tolland, Conn.
- Ingersoll Milling Machine Co., Rockford, Ill.
- Pedrick & Ayer, Phila., Pa.

See Alphabetical Index, Page 124.



- Mining Knives.**  
Palmer Haw. Mfg. Co., Troy, N. Y.
- Mine Lamps.**  
Darby, Edw. & Sons Phila. Pa.  
Leonard, B. E. Scranton, Pa.  
Leonard, T. F. Scranton, Pa.  
Mining Machinery.  
Fraser & Chalmers, Chicago, Ill.  
**Mining Screens.**  
Harrington & King Perforating Co., Chicago, Ill.  
Howard & Morse, 45 Fulton, N. Y.  
**Minnow Traps.**  
Wilson, Ed. C. Olney, Ill.  
**Molding Sand.**  
Chicago Foundry Supply Co., Chicago, Ill.  
Obermayer, S. Co., Cincinnati, O.  
Parson, J. W. & Co., Phila.  
Whithead Bros. Co., 517 W. 15th St., N. Y.
- Motors, Water and Electric.**  
Thomson, Houston Motor Co., Boston, Mass.
- Nail Machinery.**  
Pittsburgh Mfg. Co., Pittsburgh, Pa.  
**Nails (Cut) and Spikes.**  
Borden & Lovell, 70 West, N. Y.  
Cumberland Nail & Iron Co., Phila.  
Oxford Iron Co., 81 Washington, N. Y.  
Pottstown Iron Co., Pottstown, Pa.  
Riverside Iron Works, Wheeling, W. Va.  
Stebbins, C. J., 108 Reade, N. Y.
- Nickel Platers' Supplies.**  
Eddy Electric Mfg. Co., Windsor, Conn.  
Hanson & Van Winkle Co., Newark, N. J.  
Zucker & Levert Chemical Company, 10 to 14 Grand St., N. Y.
- Norway Shapes, Rollers of.**  
Rowland, William & Harvey, Framford, Philadelphia
- Nut Machines.**  
Dunham Nut Mch. Co., Unionville, O.  
**Nuts, Bolts, &c., Makers of.**  
American Bolt & Nut Co., Lowell, Mass.  
American Screw Co., Providence, R. I.  
Blake & Johnson, Waterbury, Conn.  
Haskell, Wm. H. Co., Pawtucket, R. I.  
Port Chester Bolt and Nut Co., Port Chester, N. Y.  
Russell, Burdall & Ward, Port Chester, N. Y.  
Sternberger, J. H. & Son, Reading, Pa.  
Wilson, J. Fred, Worcester, Mass.  
Wm. H. Haskell Co., Pawtucket, B. I.
- Oil Cans and Lubricators.**  
Sherwood Mfg. Co., Buffalo, N. Y.
- Oil and Grease Cans.**  
Lunkheimer Co., Cincinnati, Ohio.
- Oil Strainers.**  
Pike Mfg. Co., Pike Station, N. H.
- Ore Sampling Machines.**  
Fraser & Chalmers, Chicago, Ill.
- Ores.**  
Wister, Francis, Philadelphia, Pa.
- Oranges.**  
Scranton Forging Co., Scranton, Pa.  
Woodruff, Walter W. & Sons, Mt. Carmel, Conn.
- Packing.**  
Billington, Jas. H. & Co., Phila., Pa.  
Morris, Robert, St. Louis, Mo.  
N. Y. Beltung & Packing Co. Ltd., N. Y.
- Paddocks.**  
Ames Sword Co., Chicopee, Mass.  
Fram, E. T., Lancaster, Pa.  
Hillebrand & Wolf, Phila., Pa.  
Miller Lock Co., Philadelphia, Pa.
- Paints.**  
Detroit Grapuate Mfg. Co., Detroit, Mich.  
Dixon, Jos. Crucible Co., Jersey City, N. J.  
Garry Iron & Steel Roofing Co., Cleveland, O.
- Paint Burners.**  
Dangler Sove. Mfg. Co., Cleveland, O.
- Patent Self-Acting.**  
Ashley, J. A., Washington, D. C.  
Fitzgerald, S. C., Washington, D. C.  
Hawson & Howson, Phila. & Washgton.  
Jenner, H. W. T., Washington, D. C.  
Faine & Ladd, Washington, D. C.  
Stocking, E. B., Washington, D. C.
- Perforating Machines.**  
Clinton Wire Cloth Co., Clinton, Mass.  
Harrington & King Perforating Co., Chicago, Ill.
- Phosphor Bronze.**  
Phosphor Bronze Smelting Co., Limited, 512 Arch, Philadelphia.
- Phosphor Bronze.**  
Crescent Phosphorized Metal Co., Philadelphia, Pa.  
Crosby Steam Gauge & Valve Co., Boston, Mass.
- Picks and Mattocks.**  
Halk & Naumann, 516 Pearl, N. Y.
- Pile Drivers.**  
Plumb, Fayette R., Philadelphia, Pa.
- Pile Iron Storage.**  
Am. Pile Iron Storage Warrant Co., 44 Wall, N. Y.
- Pile Drivers.**  
Vulcan Iron Wks., Chicago, Ill.
- Pipe, Bent.**  
National Pipe Bending Co., New Haven
- Pipe Cutting and Threading Machines.**  
Bignall & Keeler Mfg. Co., St. Louis, Mo.  
Merrill Mfg. Co., Toledo, O.  
Pancost & Sons, Philadelphia.  
Saunders & Sons, D. Yonkers, N. Y.
- Pipe Grips.**  
Prentiss Vise Co., 44 Barclay, N. Y.
- Pipes, Fittings, &c., Makers of.**  
McNab & Harlin Mfg. Co., N. Y.
- Pipe Water and Gas, Makers of.**  
Cumberland Nail & Iron Co., Phila.  
Donaldson Iron Co., Emmaus, Pa.  
Riverside Iron Works, Wheeling, W. Va.
- Plane Irons, Manufacturers of.**  
Buck Bros., Millbury, Mass.
- Planes, Manufacturers of.**  
Blaney Bros. & Level Co., N. Y.
- Plate Bending Rollers.**  
Schneeckloth, H. A., 530 W. 28th St., N. Y.
- Plate, Iron and Steel, Mfrs of.**  
Atna Iron & Steel Co., Bridgeport, O.  
Lukens Iron & Steel Co., Coatesville, Pa.
- Plating, Nickel, Brass and Silver.**  
Angus, C. H. Albany, N. Y.  
Shepard Hdw. Co., Buffalo, N. Y.  
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Plumbage.**  
Chicago Fdy. Supply Co., Chicago, Ill.
- Plows.**  
Ross, A. M. & Co., Illon, N. Y.
- Polishing Machines.**  
Watson & Stillman, 204 E. 43d, N. Y.
- Polishing Wheel.**  
La Massena, C. E. Co., Newark, N. J.
- Post Hole Diggers.**  
Buckeye Mfg. Co., Union City, Ind.  
Gibbs Mfg. Co., Canton, Ohio.  
Graham, John H. & Co., 113 Chambers St., New York.  
Kohler, F. E. & Co., Canton, O.  
Waters, L. H. & Co., Philadelphia, Pa.
- Putty Nettings.**  
Barnum, E. T., Detroit, Mich.  
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.  
N. J. Wire Cloth Co., Trenton, N. J.  
"Silver Finish."
- Power.**  
Lafin & Rand Powder Co., 29 Murray New York Powder Co., 62 Liberty St., N. Y.
- Power Hack Saws.**  
Stover Novelty Wks., Freeport, Ill.
- Pump Hammers.**  
Cradley & Co., Syracuse, N. Y.  
Belden Mach. Co., New Haven, Conn.  
Dienelt & Eisenhardt, Philadelphia.  
Dupont Mfg. Co., St. Johnsbury, Vt.  
Hackney Hammer Co., Cleveland, O.  
Jenkins & Lingie, Bellefonte, Pa.
- Power Pumps and Saws.**  
Eaton, Geo. H. & Co., Boston, Mass.  
Ferracute Mch. Co., Bridgeport, N. J.
- Presses, Dies, &c.**  
E. W. Bliss Co., Brooklyn, N. Y.  
Crosby, G. A. & Co., Chicago, Ill.  
Ferracute Mch. Co., Bridgeport, N. J.  
Stark Mch. & Tool Co., Buffalo, N. Y.  
Stiles & Parker Press Co., Brooklyn, N. Y.  
Waterbury Mch. Co., Waterbury, Conn.
- Presses, Power, Makers of.**  
Bliss, E. W. Co., Brooklyn, N. Y.  
Eaton, Geo. H. & Co., Boston, Mass.  
Havilland, E. J. Mch. Co., Waterbury, Ct.  
Merriman, A. H. & Co., Meriden, Conn.  
Stark Mch. & Tool Co., Buffalo, N. Y.  
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.
- Pulley Fixings.**  
Foley, J. W. & Co., Cincinnati, O.
- Pulleys.**  
Great Western Pin Co., Toledo, O.  
Heeves Pulley Co., Columbus, O.
- Pulverizing Mill.**  
Bradley Fertilizer Co., Boston, Mass.
- Pumping Machinery.**  
Dean Bros. Steam Pump Works, Indianapolis, Ind.  
Hooker-Collie Steam Pump Co., Chicago, Ill.  
Lucas, C. O. & Co., Greenville, Ohio.  
McGowan, J. H. & Co., Cincinnati, O.  
Maslin, J. & Son, Jersey City, N. J.  
Norwalk Iron Wks. Co., So. Norwalk, Conn.  
Southark Fdy. & Mch. Co., Phila., Pa.  
Valley Pump Wks., Easthampton Mass.  
Worthington, Henry R., 86 & 88 Liberty St., N. Y.
- Pumps, makers of.**  
Bellevue Pump Co., Bellevue, Iowa.  
Deming Co., Salem, O.  
Douglas, W. B. & Co., Middletown, Conn.  
East, Wm. & Co., Springfield, O.  
Myers, F. E. & Bro., Ashland, O.  
St. Joseph Pump Co., St. Joseph, Mo.
- Punches and Shears, Hand and Power.**  
Cleveland Hdw. Co., Cleveland, O.  
New Dorr Mfg. Co., 318 W. 28th St., N. Y.  
Stark Mch. & Tool Co., Buffalo, N. Y.
- Punching and Shearing Presses.**  
E. W. Bliss Co., Brooklyn, N. Y.  
Cockburn Barrow & Mch. Co., Jersey City, N. J.  
Crosby, G. A. & Co., Chicago, Ill.  
Schneeckloth, H. A., 530 W. 28th St., N. Y.  
Stiles & Parker Press Co., Brooklyn, N. Y.
- Rails, Old and New.**  
Wals & Roos, Punch & Shear Co., Cincinnati, Ohio.
- Waterbury Farrel Foundry and Mch. Co., Waterbury, Conn.**  
Watson & Stillman, 204 E. 43d, N. Y.
- Rails, Old and New.**  
Hir, B. L. K., Chicago, Ill.  
Perry, W. H. & Co., Providence, R. I.  
Richards, J. H. & Co., Pittsburgh, Pa.
- Railway Supplies.**  
Scully Steel & Iron Co., Chicago, Ill.  
Burditt & Williams, Boston, Mass.  
Estey, W. S., 65 Fulton, N. Y.  
Ripley Mfg. Co., Unionville, Conn.  
Sun Mfg. Co., Greenfield, O.
- Razors.**  
Butcher, W. & S., 135 Duane St., N. Y.  
Curley, J. & Bro., 6 Warren St., N. Y.  
Electric Cutlery Co., 115 Chambers, N. Y.  
Schultz, E. Othar, 92 Reade St., N. Y.  
Southington Cutlery Co., Southington, Conn.  
J. R. Torrey Razor Co., Worcester, Mass.
- Refrigerators.**  
Challenge Curn Planter Co., Grand Rapids, Mich.  
Pierce, Geo. N. & Co., Buffalo, N. Y.
- Refrigerator Door Fasteners.**  
Conroy, P. J. & Co., Philadelphia.
- Rivets.**  
Blake & Johnson, Waterbury, Conn.  
Burden Iron Co., Tr. y. N. Y.  
Cobb & Drew, Plymouth, Mass.  
Henderson, Jas. S., 165 Greenwich, N. Y.  
Plymouth Mills, Plymouth, Mass.  
Sternberger, J. H. & Son, Reading, Pa.  
Townsend, W. P. & Co., New Brighton, Pa.
- Riveting Machines.**  
Adt, Jno. & Sons, New Haven, Conn.
- Rock Drills.**  
Truman, Leonard Drill & Mfg. Co., Birdsboro, Pa.  
Rand Drill Co., 23 Park Place, N. Y.
- Rolling Mill Machinery.**  
Birmingham Iron Fdry, Birmingham, Conn.  
Booth, The Lloyd, Co., Youngstown, O.  
Leeburg Foundry & Mch. Co., Pittsburgh, Pa.  
Mahoning Fdry & Mch. Co., Danville, Pa.  
Morgan Construction Co., Worcester, Mass.  
Robinson-Rea Mfg. Co., Pittsburgh.  
Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.  
Watersbury Farrel Foundry & Mch. Co., Waterbury, Conn.
- Roll Lathes.**  
Totten & Hogg Iron & Steel Fdry Co., Pittsburgh, Pa.
- Rolls, Chilled, Sand and Steel.**  
Booth, The Lloyd, Co., Youngstown, O.  
Chicago Foundry Co., Chicago, Ill.  
Garrison, A. Fdry. Co., Pittsburgh, Pa.  
Johnson Foundry Co., Johnstown, Pa.  
Seaman, Sneath & Black, Pittsburgh.  
Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.
- Roofing.**  
Berlin Iron Bridge Co., E. Berlin, Conn.  
Boston Bridge Works, Boston, Mass.  
Cambridge Roofing Co., Cambridge, O.  
Cincinnati Corrugating Co., Plaqua, O.  
Johns, H. W. Mfg. Co., 87 Maiden Lane, N. Y.
- Ropes and Web Goods.**  
Covers Mfg. Co., West Tr., N. Y.  
Covers Saddlery Wks., Farmer, N. Y.
- Rubber Goods.**  
Canfield, H. O., Bridgeport, Conn.
- Rules, Manufacturers of.**  
Lufft Rule Co., Saginaw, Mich.  
Standard Tool Co., Athol, Mass.  
Stanley Rule & Level Co., 29 Chambers, N. Y.
- Sad Iron Holders.**  
Kisner, J. L. & Co., Chicago, Ill.
- Sad Irons.**  
Cleveland Dry Co., Cleveland, O.  
Universal Sad Iron Co., Milwaukee, Wis.
- Sand Paper.**  
Baeder, Adamson & Co., Phila., Pa.
- Sash Balances.**  
Caldwell Mfg. Co., Rochester, N. Y.  
Huginin, R. B. & W. F. Mfg. Co., Hartford, Conn.  
Pittman Sash Balance Co., Rochester, N. Y.
- Sash Cord and Chains.**  
Morton, Thos., 65 Elizabeth, N. Y.  
Ossawatim Mills Co., Norwich, Conn.  
Samson Cordage Works, Boston, Mass.  
Smith & Fegge, Mfg. Co., Bridgeport.
- Sash Holders.**  
Moley, Peter, Philadelphia, Pa.
- Sash Locks.**  
Champion Safety Lock Co., Cleveland, Ohio.  
Ivory, E. B. & Co., New Haven, Conn.
- Sash Pulleys.**  
Empire Portable Forge Co., Lansingburgh, N. Y.  
Palmer Hardware Mfg. Co., Troy, N. Y.
- Sash Weights.**  
Brown, E. E. & Co., Philadelphia, Pa.
- Saws, Circular.**  
Atkins, C. & Co., Indianapolis, Ind.  
Dixson, Henry & Sons, Phila., Pa.  
Jennings, C. E. & Co., 97 Chambers, N. Y.  
National Saw Co., 96 Reade St., N. Y.  
Richardson Bros., Newark, N. J.  
Simmonds Mfg. Co., Fitchburg, Mass.
- Saws, Hand.**  
Kohler, F. E. & Co., Canton, Ohio.  
Taintor Mfg. Co., 84-86 Chambers, N. Y.
- Scales, Manufacturers of.**  
Buffalo Scale Co., Buffalo, N. Y.  
Chattillon, John & Sons, 85-89 Cliff, N. Y.  
Osgood & Co., Binghamton, N. Y.
- Screw Drivers.**  
Alford & Berkele Co., 75 Chambers St., Mass.
- Screw Plate and Pipe Cutter.**  
Jared Mfg. Co., Erie, Pa.
- Screws, Makers of.**  
American Screw Co., Providence, R. I.  
Blake & Johnson, Waterbury, Conn.  
Wm. H. Haskell Co., Pawtucket.  
Miles, F. S., 205 Quarry, Philadelphia.  
National Screw & Tack Co., Cleveland, Ohio.  
Reynolds & Co., New Haven, Conn.  
Worcester Machine Screw Co., Worcester, Mass.
- Screw Saws.**  
Barnes, W. F. & John, Rockford, Ill.  
Seneca Falls Mfg. Co., Seneca Falls, N. Y.  
Allenworth Rolling Mill, Watertown, N. Y.  
Pike Mfg. Co., Pike Station, N. H.  
Cleveland Stone Co., Cleveland, O.  
Huron Grindstone Co., Port Austin, Mich.
- Shaffing, Makers of.**  
Crescent, Geo. V., Co., Philadelphia, Pa.  
Fitzsimons & Co., Philadelphia, Pa.  
Fitzsimons & Co., Cleveland, Ohio.  
Sellers, Wm. & Co., Inc. Phila. Pa.  
Stow Mfg. Co., Binghamton, N. Y.
- Shaped Iron and Steel, Manufacturers of.**  
Atna Iron & Steel Co., Bridgeport, O.  
Allenworth Rolling Mill, Watertown, N. Y.  
Belleville Steel Co., St. Louis, Mo.  
Illinois Steel Co., Chicago, Ill.  
Lockhart Iron & Steel Co., Pittsburgh, Pa.  
Passaic Rolling Mill Co., Paterson, N. J.
- Pottsville Iron & Steel Co., Pottsville, Pa.**  
Roberts, A. & P. & Co., Phila., Pa.  
The Phoenix Iron Co., Phila., Pa.
- Shears and Scissors.**  
Ame Shear Co., Bridgeport, Conn.  
Heinrichs, R. Sons Co., Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**  
Atna Iron and Steel Co., Bridgeport, Cambridge Iron & Steel Co., Cambridge, Ohio.  
Chess Bros., Pittsburgh, Pa.  
Moorehead-McCleave Co., Pittsburgh, Pa.  
Pieron & Co., 24-26 West St., N. Y.  
Rely, John W., Fort Hunter P. O., Pa.  
Singer, Nimick & Co., La., Pittsburgh, Pa.  
The Mahoning Valley Iron Co., Youngstown, O.  
Alan Wood Co., Philadelphia.  
W. Dewees Wood Co., McKeesport, Pa.
- Sheet Zinc.**  
Mathiessen & Hegeler Zinc Co., La Salle, Ill.
- Shelf Brackets.**  
Koch, A. B. & Co., Peoria, Ill.
- Shovels, Spades and Scoops.**  
Ross, A. M. & Co., Illon, N. Y.
- Sinks.**  
Douglas, W. & B., Middletown, Conn.
- Skates, Ice.**  
Dane, Stoddard & Kendall, Boston, Mass.  
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Skates, Roller.**  
Henley, M. C., Richmond, Ind.  
Union Hardware Co., Torrington, Conn.  
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Skylights.**  
Kientz Horticultural & Skylight Wks., 145 Liberty St., N. Y.
- Smelting Works.**  
Reeves, Paul S., 760 S. Broad, Phila.
- Speaking Tubes.**  
Ostrander, W. R. & Co., N. Y.  
Wolenski, J. F., Chicago, Ill.
- Specialties, Pat. Articles.**  
Kingslow, O., Cleveland, O.
- Speed Indicators.**  
Church & Sleight, 102 Fulton St., N. Y.
- Spelter.**  
Mathiessen & Hegeler Zinc Co., La Salle, Ill.
- Spoons and Forks.**  
Holmes & Edwards Silver Co., Bridgeport, Conn.  
Rogers, The Wm. Mfg. Co., Hartford, Conn.
- Sporting Goods.**  
Bartley & Graham, 313-315 B'way, N. Y.
- Spring Hinges.**  
Bardale, J. & Co., 151 Baxter St., N. Y.  
Chicago Spring Co., Chicago, Ill.  
Fullman Sash Balance Co., Rochester, N. Y.  
Shepard Hdw. Co., Buffalo, N. Y.  
Stover Mfg. Co., Freeport, Ill.  
Van Wagener & Williams Co., 14 Warren St., N. Y.
- Spring Key and Cotters.**  
Jencks Mfg. Co., Pawtucket, R. I.  
Whitman & Barnes Mfg. Co., Syracuse, N. Y.
- Stamped Ware.**  
Am. Stamping Co., 104 & 106 John St., New York
- Stamping Works.**  
Avery Stamping Co., Cleveland, O.  
Cleveland Stamping & Tool Co., Cleveland, O.
- Staples.**  
Cobb & Drew, Plymouth, Mass.  
Fletcher E. H. & Co., Binghamton, N. Y.
- Steel Blanks.**  
Ashcroft Mfg. Co., 111 Liberty St., N. Y.  
Bristols Mfg. Co., Waterbury, Conn.
- Steel Hammers, &c., makers of.**  
Dienelt & Eisenhardt, Philadelphia.  
Dudgeon, Richard, 24 Columbia Street, N. Y.
- Steel Heating.**  
Webster Warren & Co., Phila., Pa.
- Steam Separators.**  
Goubert Mfg. Co., 32 Cortland St. N. Y.  
Harrison Safety Boiler Wks. Phila. Pa.
- Steel Balls.**  
Grant Anti-Friction Ball Co., Fitchburg, Mass.
- Steel Cold Rolled Strip.**  
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel Figures and Alphabets.**  
Krogsrud, W., 61 Fulton, N. Y.
- Steel Importers.**  
Abbott, Jere & Co., N. Y. and Boston.  
Hobson, Francis, Seaman & Co., 97 John St., N. Y.  
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N. Y.  
Milne, A. & Co., 1 Broadway, N. Y.  
Newton & Shipman, 83 John, N. Y.  
Page, Newell & Co., Boston, Mass.  
Weatherill Bros., 95 Liberty St., N. Y.  
Whitney, A. R. & Co., B'way, N. Y.  
Wolff, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel (Mushet's Special).**  
Jones, B. M. & Co., Boston.
- Steel Manufacturers.**  
Atna Iron & Steel Co., Bridgeport, O.  
Bethlehem Iron Co., Bethlehem, Pa.  
Baker, Herman & Co., 103 Duane St.  
Buffalo Steel Foundry, Buffalo, N. Y.  
Carbon Steel Co., Pittsburgh, Pa.  
Chester Steel Castings Co., Phila., Pa.  
Chrome Steel Works, Brooklyn, N. Y.  
Crescent Steel Co., Pittsburgh, Pa.  
Frankford Steel Co., Philadelphia.  
Gautier Steel Department or Cambria Iron Co., Johnstown, Pa.  
Hobson, Francis, Seaman & Co., 97 John St., N. Y.



- Illinois Steel Co., Chicago, Ill.**  
 Jessop, Wm. & Sons, Sheffield, Eng.  
 land, or 91 John, N. Y.  
 Jones, B. M. & Co., Boston, Mass.  
 Kayer, Ellison & Co., Sheffield, Eng.  
 La Belle Steel Co., Pittsburgh, Pa.  
 Lukens Iron & Steel Co., Coatesville, Pa.  
 Moorehead-McCleane Co., Pittsburgh, Pa.  
 Moss, F. W., 88 John, N. Y.  
 Naylor & Co., 45 Wall, N. Y.  
 Pennsylvania Steel Co., Steelton, Pa.  
 Pickens & Co., 24-27 West, N. Y.  
 Pottsville Iron and Steel Co., Pottsville, Pa.  
 Rely, J. W., Fort Hunter P. O., Pa.  
 Rowland, Wm. & Harvey, Frankford, Philadelphia.  
 Slinger, Nimick & Co., Pittsburgh.  
 Stanley Works, New Britain, Conn.  
 Steel & Iron Improvement Co., Pittsburg, Pa.  
 Taylor Iron & Steel Co., High Bridge, N. J.  
 Wordlaw, S. & C., Sheffield, Eng.  
 Wetherell Bros., 93 Liberty, N. Y.  
 Wheeling Steel & Iron Co., Wheeling, W. Va.  
 Wilmut & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel, Manufacturers' Agents.**  
 Barnes, C. K. & Co., Philadelphia, Pa.  
 Corning, Edw. & Co., 29 B'way, N. Y.  
 Lindsay, Jas. G. & Co., Phila., Pa.  
**Steel Mills, Manufacturers.**  
 Bethlehem Iron Co., Bethlehem, Pa.  
 Cambria Iron Co., Johnstown, Pa.  
 Illinois Steel Co., Chicago, Ill.  
 Penna. Steel Co., Steelton, Pa.  
 Montour Iron & Steel Co., Danville, Pa.  
 Riverside Iron Wks., Wheeling, W. Va.  
**Steel Spiral Springs, Manufacturers.**  
 Chadillon, John & Sons, N. Y.  
 Roland, Wm. & Harvey, Frankford, Pa.  
 Wolf, R. H. & Co., Ltd., 118 Street and Harlem River, N. Y.
- Steel, Tools.**  
 Frankford Steel Co., Philadelphia, Pa.  
 Jessop, Wm. & Sons, Sheffield, Eng.  
 land, or 91 John, N. Y.  
 La Belle Steel Co., Pittsburgh, Pa.
- Step Ladders.**  
 Bicycle Step Ladder Co., Chicago, Ill.  
 Croissant, M., Albany, N. Y.
- Sticks and Dies.**  
 Armstrong Mfg. Co., Bridgeport, Conn.  
 Billings & Spencer Co., Hartford, Conn.  
 Butterfield & Co., Derby Line, Vt.  
 Hart Mfg. Co., Cleveland, O.  
 Saunders & Sons, D., Yonkers, N. Y.  
 Wells Bros. & Co., Greenfield, Mass.  
 Wiley & Russell Mfg. Co., Greenfield, Mass.
- Stove Linings.**  
 Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles.**  
 Cheney, S. & Son, Manlius, N. Y.
- Stove Trimmings.**  
 Troy Nickel Works, Troy, N. Y.
- Street Lamps.**  
 Dietz, R. E. Co., 60 Light St., N. Y.  
 Steam Gauge & Lantern Co., Syracuse, N. Y.
- Strops.**  
 Electric Cutlery Co., 113 Chambers, N. Y.  
 J. R. Torrey & Co., Worcester, Mass.
- Stropping Machines.**  
 Schmitz, E. Lothar, 92 Reade St., N. Y.
- Structural Iron Work.**  
 Berlin Iron Bridge Co., East Berlin, Conn.  
 Boston Bridge Wks., Boston, Mass.  
 Lindsay, Jas. G. & Co., Phila., Pa.  
 Wrought Iron Bridge Co., Canton, O.
- Sulphuric Acid.**  
 Mathlessen & Hegeler Zinc Co., La Salle, Ill.
- Tack Hammers.**  
 Smethport Mch. Co., Ltd., Smethport, Pa.
- Tacks, Brads, Staples, &c.**  
 Atlas Tack Corporation, Boston, Mass.  
 A. Field & Sons, Taunton, Mass.  
 Cobb & Drew, Plymouth, Mass.  
 Grand Crossing Tack Co., Grand Cross, Ill.  
 Nat. Screw & Tack Co., Cleveland, O.  
 Phillips, E. & Sons, South Hanover, Plymouth Mills, Plymouth, Mass.  
 Trufant, W. E., Whitman, Mass.
- Taps and Dies.**  
 Esterfield & Co., Derby Line, Vt.  
 Manning, Maxwell & Moore, 111 Liberty, N. Y.
- Wells Bros. & Co., Greenfield, Mass.**  
 Wiley & Russell Mfg. Co., Greenfield, Mass.
- Testing Laboratories.**  
 Kiehle Bros. Testing Mch. Co., Philadelphia.
- Testing Machines.**  
 Kiehle Bros. Testing Mch. Co., Phila.
- Theatrical Hardware.**  
 Wollensak, J. F., Chicago, Ill.
- Chill Springs.**  
 Sabin Machine Co., Montpelier, Vt.
- Time Record.**  
 Scattergood, H. W., Phila., Pa.
- Tinners' Hardware.**  
 Berger Bros., Philadelphia, Pa.
- Tin Plate Machinery.**  
 Lloyd Booth Co., Youngtown, Ohio.
- Tinware.**  
 Am. Stamping Co., 104 & 106 John St., Matthal, Ingram & Co., Baltimore, Md.
- Toe Calks, Steel.**  
 Burke, P. F., Boston, Mass.
- Tool Chests.**  
 Am. Tool Co., 200 W. Houston St., N. Y.  
 Jennings C. E. & Co., 97 Chambers St., N. Y.
- Tools.**  
 Atkins, E. C. & Co., Indianapolis, Ind.  
 Britton, Horace E., Stoughton, Mass.  
 Brown, R. H. & Co., New Haven, Conn.  
 Chamrell Tool Co., Reading, Pa.  
 Cincinnati Tool Co., Cincinnati, O.  
 Jennings, C. E. & Co., 97 Chambers, N. Y.  
 Krauter & Co., Newark, N. J.  
 Mayhew, H. H. Co., Shelburne Falls, Mass.  
 Millers Falls Co., 93 Reade St., N. Y.  
 Richardson, C. F. & Son, Athol, Mass.  
 Standard Tool Co., A. hol, Mass.  
 Stanley Rule & Level Co., 29 Chambers, Starrett, L. S., Athol, Mass.  
 Tower & Lyon, 35 Chambers St., N. Y.
- Tool, Blacksmith and Wheelwrights.**  
 Buffalo Forge Co., Buffalo, N. Y.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 Illinois Iron & Bolt Co., Carpenterville, Ill.
- Plumb, Fayette R., Philadelphia, Pa.**  
 Wiley & Russell Mfg. Co., Greenfield, Mass.
- Tools, Steam and Gas Fitters'.**  
 Saunders & Sons, D., Yonkers, N. Y.
- Torches, Oil and Gasolene.**  
 Dangler Store & Mfg. Co., Cleveland, O.  
 Schneider & Frenkamp Co., Cleveland, Ohio.
- Standard Lighting Co., Cleveland, O.**
- Transom Lifters.**  
 Wollensak, J. F., Chicago, Ill.
- Transom Plates.**  
 Missouri Mal. Iron Co., E. St. Louis, Mo.
- Trieycles.**  
 Pierre, Geo. N. & Co., Buffalo, N. Y.
- Trousers Stretcher.**  
 Gregory, Geo. H., Boston, Mass.
- Trucks, Manufacturers of.**  
 Berger Bros., Philadelphia, Pa.  
 Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.  
 Clark, G. P., Windsor Locks, Conn.  
 Lansing Wheelbarrow Co., Lansing, Mich.
- Thompson Mfg. Co., Elkhart, Ind.**
- Trusses, Brass and Copper.**  
 Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
- Randolph & Clowes, Waterbury, Conn.**
- Tubes, Steel.**  
 Shelby Steel Tube Co., Shelby, O.
- Tumbling Barrels.**  
 Henderson Bros., Waterbury, Conn.
- Turnbuckles.**  
 Cleveland City Forge and Iron Co., Cleveland, O.  
 Merrill Bros., Brooklyn, E. D.
- Twist Drills, Makers of.**  
 Cleveland Twist Drill Co., Cleveland.  
 Graham Twist Drill & Chuck Co., Detroit, Mich.  
 Morse Twist Drill & Machine Co., New Bedford, Mass.  
 New Process Twist Drill Co., Taunton, Mass.
- Standard Tool Co., Cleveland.**
- Valves, Gas, Water and Steam.**  
 Chapman Valve Mfg. Co., Boston.  
 Jenkins Bros., 71 John, N. Y.
- Lunkenheimer Co., Cincinnati, Ohio.**  
 McNab & Harlin Mfg. Co., 56 John N. Y.  
 Mason Regulator Co., Boston, Mass.
- Ventilating Fans.**  
 Huyett & Smith Mfg. Co., Detroit, Mich.
- Ventilator Appliances.**  
 Howard & Morse, 45 Fulton, N. Y.
- Vise Jaws.**  
 Newark Mch. Tool Co., Newark, N. J.
- Vises.**  
 Hollands Mfg. Co., Erie, Pa.  
 Howard Iron Works, Buffalo, N. Y.  
 Prutis Vise Co., 44 Barclay, N. Y.  
 Tower & Lyon, 35 Chambers St., N. Y.  
 Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Wagon Jacks.**  
 Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.  
 Covert Mfg. Co., West Troy, N. Y.  
 Covert's Saddlery Works, Farmer, N. Y.
- Washers.**  
 Baskell, Wm. H. Co., Pawtucket, R. I.  
 Lanman, E. B., Columbus, Ohio.  
 Milton Mfg. Co., Milton, Pa.  
 Sternbergh, J. H. & Son, Reading, Pa.
- Washing Machines.**  
 Buckeye Churn Co., Sidney, O.  
 Diether & Barrows, Ft. Wayne, Ind.  
 Hunsfeld, E. H., Cincinnati, Ohio.  
 Wayne, A. Mfg. Co., Ft. Wayne, Ind.
- Water Meters.**  
 Worthington, H. Henry R., 86 & 88 Liberty, N. Y.
- Water Wheels.**  
 F. Cole, Robt. & Son Co., Baltimore, Md.
- Weed Destroyer.**  
 Shaw & Clancy, Racine, Wis.
- Well Boring Machines.**  
 Oil Well Supply Co., Pittsburgh, Pa.
- Well Machinery.**  
 Amer. Well Works, Aurora, Ill.
- Wheelbarrows.**  
 Akron Tool Co., Akron, O.  
 Amer. Steel Scaper Co., Sidney, Ohio.  
 Cockburn Barrow & Mch. Co., Jersey City, N. J.  
 Elbourne & Jacobs Mfg. Co., Columbus, Ohio.  
 Lansing Wheelbarrow Co., Lansing, Mich.  
 S. Dwyer Steel Scaper Co., Sidney, O.  
 Sweatt Mfg. Co., Minneapolis, Minn.
- Whips.**  
 American Whip Co., Westfield, Mass.
- Window Cords, Makers of.**  
 Samson Cordage Works, Boston, Mass.
- Wire, Manufacturers of.**  
 Amer. Spiral Spring Co., Pittsburgh, Pa.  
 Amer. Wire Nail Co., Anderson, Ind.  
 Consolidated Steel & Wire Co., St. Louis, Mo.  
 Eastwood Wire Mfg. Co., Belleville, N. J.  
 Gaudier Steel Department of Cambria Iron Co., Johnstown, Pa.  
 Haley Mfg. Co., Concord, N. H.  
 Miller & Van Winkle, Brooklyn, N. Y.  
 New Castle Wire Nail Co., New Castle, Pa.  
 New Haven Wire Mfg. Co., New Haven, Conn.  
 Salem Wire Nail Co., Salem, O.  
 Trenton Iron Co., Trenton, N. J.  
 Washburn & Moen Mfg. Co., Worcester, Mass.  
 Wethers & Sons, 93 Liberty St., N. Y.  
 Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.  
 Wright & Colton Wire Cloth Co., Worcester, Mass.
- Wire Cloth.**  
 Barnum, E. T., Detroit, Mich.  
 Clinton Wire Cloth Co., Clinton, Mass.  
 Darby Edward & Sons, Philadelphia.  
 Eastwood Wire Mfg. Co., Belleville, N. J.  
 Estey, W. S., 65 Fulton, N. Y.  
 Gilbert & Bennett Mfg. Co., 42 Cliff Howard & Morse, 45 Fulton, N. Y.  
 N. J. Wire Cloth Co., Trenton, N. J.  
 Reliance Wire Wks. Co., Milwaukee, Wis.  
 Scheeler & Sons, Buffalo, N. Y.  
 Wickwire Bros., Cortland, N. Y.  
 W. S. Tyler Wire Works Co., Cleveland.
- Wire Cutters.**  
 Cronk & Hanger Co., Elmira, N. Y.  
 Higginum Hdw. Co., Higginum, Conn.  
 King, J. M. & Co., Watertown, N. Y.
- Wire Dies.**  
 McFarland, Wm., Trenton, N. J.  
 Newton & Shipman, 53 John, N. Y.
- Wire Door Mats.**  
 Hartman Mfg. Co., Beaver Falls, Pa.  
 The Wire Goods Co., Worcester, Mass.
- Wire Fences.—See Fencing, Iron and Wire.**
- Wire Goods, Manufacturers of.**  
 Darby, Edward & Sons, Phila.  
 Gilbert & Bennett Mfg. Co., N. Y.  
 E. Jenck Mfg. Co., Pawtucket, R. I.  
 Ludlow-Saylor Wire Co., St. Louis.  
 Ossawan Mills Co., Norwalk, Conn.  
 Scheeler & Sons, Buffalo, N. Y.  
 Whitman & Barnes Mfg. Co., Syracuse, N. Y.
- Wire Goods Co., Worcester, Mass.**
- Wickwire Bros., Cortland, N. Y.**
- Williamson, C. T. Wire Novelty Co., Newark, N. J.**
- Wright & Colton Wire Cloth Co., Worcester, Mass.**
- Wire Machinery.**  
 Am. Tool Wks., Cleveland, O.  
 Manville, E. J. Mch. Co., Waterbury, Ct.  
 Morgan Construction Co., Worcester, Mass.
- Waterbury Mch. Co., Waterbury, Conn.**
- Wire Reels.**  
 Buchanan Fence Co., Smithville, O.
- Wire Straightening and Cutting Machinery.**  
 Adt, John & Son, New Haven, Conn.
- Wire Nails.**  
 Amer. Wire Nail Co., Anderson, Ind.  
 Backus Wire Nail Co., Cleveland, O.  
 Consolidated Steel & Wire Co., St. Louis, Mo.  
 Field, A. & Sons, Taunton, Mass.  
 Indiana Wire Fence Co., Crawfordsville, Ind.  
 Kilmer Mfg. Co., Newburg, N. Y.  
 New Castle Wire Nail Co., New Castle, Pa.  
 Phillips, E. & Sons, South Hanover, Mass.  
 Phillips, Townsend & Co., Phila., Pa.  
 Plymouth Mills, Plymouth, Mass.  
 Salem Wire Nail Co., Salem, O.  
 Taunton Wire Nail Co., Taunton, Mass.  
 Whitney, A. H. & Co., New York, N. Y.
- Wire Rope, Steel.**  
 Amer. Wire Nail Co., Anderson, Ind.  
 Consolidated Steel & Wire Co., St. Louis, Mo.  
 Illinois Steel Co., Chicago, Ill.  
 New Castle Wire Nail Co., New Castle, Pa.  
 Washburn & Moen Mfg. Co., Worcester, Mass.
- Whitney, A. R. & Co., 17 B'way, N. Y.**
- Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.**
- Wire Rope, Iron and Steel.**  
 Broderick & Bascom Rope Co., St. Louis, Mo.  
 California Wire Works, San Francisco.  
 Hazard Mfg. Co., Wilkesbarre, Pa.  
 A. Leschen & Sons Rope Co., St. Louis.  
 Trenton Iron Co., Trenton, N. J.  
 Washburn & Moen Mfg. Co., Worcester, Mass.
- Williamsport Wire Rope Co., Williamsport, Pa.**
- Woodenware.**  
 Tucker & Dorsey Mfg. Co., Indianapolis, Ind.
- Wood-Working Machinery.**  
 Fay, J. A., & Egan Co., Cincinnati, O.  
 Sebastian Lathe Co., Cincinnati, Ohio.  
 Sebastian, May & Co., Sidney, O.  
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Wrenches, Manufacturers of.**  
 American Saw Co., Trenton, N. J.  
 Bemis & Call Hardware & Tool Co., Springfield, Mass.  
 Billings, Spencer & Co., Hartford, Conn.  
 Capitol Mfg. Co., Chicago, Ill.  
 Central Iron & Steel Co., Brazil, Ind.  
 Coes Wrench Co., Worcester, Mass.  
 Gendron Iron Wheel Co., Toledo, O.  
 Portsmouth Wrench Co., Boston, Mass.  
 Tower & Lyon, 35 Chambers St., N. Y.  
 Truitt Mfg. Co., Roxbury, Mass.  
 Williams, J. H., Brooklyn, N. Y.
- Wringers.**  
 Colby Wringer Co., Montpelier, Vt.

See Alphabetical Index, Page 124.

# THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

## RATES OF SUBSCRIPTION:

INCLUDING POSTAGE.

### UNITED STATES AND BRITISH AMERICA.

Weekly Edition, Issued every THURSDAY morning, . . . . .	\$4.50 a year.
Semi-Monthly Edition, First and THIRD THURSDAYS of every month, . . . . .	2.30 "
Monthly Edition FIRST THURSDAY of every month, . . . . .	1.15 "

### ALL OTHER COUNTRIES.

Per Annum, Postpaid.

Weekly Edition: \$5.00=£1=25 francs=20 marks=11 florins=6 roubles (coin)=25 lire=20 pesetas.	
Semi-Monthly Edition: \$2.50=10/=12½ francs=10 marks=6 florins=3 roubles (coin)=12½ lire=10 pesetas.	
Monthly Edition: \$1.25=5/=6¼ francs=5 marks=3 florins=1½ roubles (coin)=6¼ lire=5 pesetas.	

## RATES OF ADVERTISING:

ONE SQUARE (12 LINES, ONE INCH).

ONE INSERTION . . . . .	\$2.00	SIX MONTHS, . . . . .	\$30.00
ONE MONTH, . . . . .	7.50	ONE YEAR, . . . . .	50.00
THREE MONTHS, . . . . .	17.50	Rates for larger spaces quoted on application.	
New York (Main Office), . . . . .	96-102 Reade Street,	DAVID WILLIAMS, Publisher.	
Philadelphia, . . . . .	220 South Fourth Street,	THOMAS HOBSON, Manager.	
Pittsburgh, . . . . .	Room 509, Hamilton Building.	ROBERT A. WALKER, Manager.	
Chicago, . . . . .	59 Dearborn Street, cor. Randolph,	J. K. HANES, Business Manager.	
Cincinnati, . . . . .	Rooms 22-24 Pickering Building,	GEO. W. COPE, Resident Asso. Ed.	
St. Louis, . . . . .	Bank of Commerce Building,	HENRY SMITH, Manager.	
Boston, . . . . .	146 Franklin Street,	H. H. ROBERTS, Manager.	
Cleveland, . . . . .	219 Superior Street,	WALTER C. ENGLISH, Manager.	
		EZRA S. ADAMS, Manager.	

BRITISH AGENCY: Office of *The Ironmonger*, 42 Cannon St., London.

Remittances should be made by draft, payable to the order of DAVID WILLIAMS, on any banking house in the United States or Europe, or by P. O. Money Order on New York. When these cannot be obtained, postage stamps of any country will be received.

Newsdealers or Booksellers in any part of the world may obtain *The Iron Age* through The American News Company, New York, U. S. A. The International News Company, New York, U. S. A., and London, England; or The San Francisco News Company, San Francisco, Cal., U. S. A.

Entered at the Post Office, New York, as Second-Class Matter.

# ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Jere & Co.	20	Hampton Iron Co.	8	Frost Thill Spring Co.	105	Lean, D. R. Co.	32	Passaic Arc Casting Co.	3	Standard Lighting Co.	87
Acme Shear Co.	81	Champion Mfg. Co.	116	Fulton Iron & Engine	56	Le Count, C. W.	11	Passaic Rolling Mill Co.	32	Standard Tool Casting Co.	53
Adair, John & Son.	21	Champion Safety Lock Co.	103	Gardner, Jas. & Son.	56	Lechburg Ferry & Mch. Co.	30	Peck, A. G. & Co.	31	Standard Tool Co.	53
Adair Iron & Steel Co.	29	Chancellor Tool Co.	92	Garrison, A. Foundry Co.	28	Le Massena, C. E. & Co.	55	Pedrick & Ayer.	44	Stanley Rule & Level Co.	73
Alken, Henry.	30	Chapman Mfg. Co.	120	Garry Iron Steel Rfg. Co.	18	Leonard, J. E.	23	Penna. Diamond Drill &	44	Stanley Works.	71
Alkon Tool Co.	112	Chapman Valve Mfg. Co.	84	Garvin Mch. Co.	62	Leonard, T. F.	110	Mfg. Co.	37	Stark Mch. & Tool Co.	46
Alexander, E. & Co.	81	Chattillon, John & Sons.	110	Gautier Steel Dept.	102	Leschen, A. & Sons Rope Co.	3	Pennsylvania Mch. Co.	61	Starratt, L. S.	79
Alford & Berke Co.	81	Cheney, S. & Son.	28	Gaylor, F. L. Co.	38	Levia, Henry Co.	33	Perry & Co.	21	Steam Gauge Lantern Co.	72
Allentown Rolling Mills.	33	Chess Bros.	26	Gendron Iron Wheel Co.	93	Levin, W. & Co.	123	Phila. Drop Forge Co.	28	Stebbins, Charles J.	70
Almond, T. R.	85	Chesser Steel Casting Co.	27	Gibbs Mfg. Co.	117	Lindsay, Jas. G. & Co.	19	Phila. Engineering Wks.	31	Steel & Iron Imp. Co.	70
Am. Bit Brace & Tool Co.	84	Chicago Foundry Co.	31	Gilbert & Bennett Mfg. Co.	9	Link-Belt Engineering Co.	45	Phillips, E. & Sons.	82	Steeple, J. & Co.	63
Am. Bolt Co.	114	Chicago Fdry Supply Co.	81	Glenon & Krause	116	Lockhart Iron & Steel Co.	29	Phillips, Townsend & Co.	16	Sternbergh, J. H. & Son.	119
Am. Curry Comb Co.	105	Chicago Spring Butt Co.	104	Goodell Co.	87	Lodge & Davis Mch. Tool	60	Phoenix Horse Shoe Co.	107	Stevens Arms & Tool Co.	98
Am. Metal Co.	4	Christie, W. Wallace.	28	Goodell & Harding.	88	Lodge & Shipley Machine	59	Phoenix Bronze Sm'ts Co.	18	Stiles & Parker Press Co.	42
Am. Pig Iron & Storage	15	Chrome Steel Works.	26	Goubert Mfg. Co.	38	Lovell, Jno. P. Arms Co.	91	Pickands, Brown & Co.	21	Stover Mfg. Co.	91
Am. Saw Co.	111	Church, Isaac.	119	Gould & Eberhardt.	38	Lovell Mfg. Co., Ltd.	68	Pierce, Geo. N. & Co.	96	Stover Novelty Works.	79
Am. Screw Co.	13	Church & Sleight.	38	Graham, John H. & Co.	99	Lovell Tracy & Co.	107	Pierston & Co.	30	Stover Mfg. Co.	105
Am. Spiral Spring Co.	4	Church & Corrugating Co.	14	Graham, Passmore & Co.	116	Lovlovegrove & Co.	62	Pike Mfg. Co.	56	Stow Flexible Shaft Co.	53
Am. Stamping Co.	99	Cincinnati Mfg. Co.	102	Graham Twist Drill &	102	Loyd, John.	68	Pittsburgh Reduction Co.	18	Stuart & Peterson Co.	53
Am. Steel Scraper Co.	112	Cincinnati Milling Mch.	58	Chuck Co.	43	Lucas, C. & Co.	62	Place, Geo.	63	Sturtevant, B. F. Co.	47
Am. Tool Co.	81	Cincinnati Tool Co.	32	Grand Crossing Tack Co.	18	Luck, S. & Co.	7	Plenty Horticultural &	30	Sun Mfg. Co.	100
Am. Tool Works.	89	Cincinnati Tool Co.	32	Grand Rapids Hand Screw	86	Lundberg, Gustaf.	20	Plumb, Fayette R.	84	Supple Hardware Co.	115
Am. Well Works.	125	Clapp, Geo. M.	113	Grant Anti-Friction Ball	48	Lunkelmeier Co.	36	Plumb, & Atwood Mfg. Co.	84	Surplus, Dunn & Alder.	84
Am. Wire Nail Co.	12	Clark, Mfg. Co.	89	Grant Corundum Wheel	48	McCabe, J. H. Co.	61	Plume & Atwood Mfg. Co.	84	Sweet Mfg. Co.	112
Ames Sword Co.	104	Clark, W. J. & Co.	85	Mfg. Co.	58	McCoy, Jos. F. & Co.	75	Pollock, W. B. & Co.	38	Swindell, W. & Co.	30
Angus, C. H.	29	Cleveland Block Co.	108	Great Western Pin Co.	56	McFarland, Wm.	113	Poole, Robt. & Son Co.	38	Syracuse Steel Fdry Co.	30
Ansonia Brass & Co. Co.	29	Cleveland City Forge &	1	Green, A. H.	109	McGowan, J. H. & Co.	39	Pope Mfg. Co.	71	Taintor Mfg. Co.	79
Anthracite Brass Wks.	40	Cleveland Foundry Co.	80	Grady, Geo. H.	112	Mollvain, Wm. & Sons.	30	Port Chester Bolt & Nut	118	Tablet & Ticket Co.	68
Arcade Malleable Iron Co.	26	Cleveland Stamping &	2	Graham, John H. & Co.	99	McKay, Jas. & Co.	19	Porter, H. K.	117	Taunton Wire Nail Co.	11
Arcade Mfg. Co.	101	Cleveland Stone Co.	58	Hackney Hammer Co.	125	McKee, J. & Co.	31	Pottersburg Iron Co.	32	The Audubon Co.	26
Armstrong Mfg. Co.	42	Cleveland Twist Drill Co.	58	Haight & Clark.	28	McKinney Mfg. Co.	102	Pottsville Iron & Steel Co.	18	Thompson Mfg. Co.	59
Artificial Gas Eng'ng Co.	38	Cleveland & Hardwick.	37	Halsey, Jas. T.	63	McKinney Dash & Hdw. Co.	107	Powell Planer Co.	46	Thomson Electric Welding	28
Aschman Steel Cast'g Co.	6	Clinch Wire Cloth Co.	67	Halsey, Jas. T.	63	McLean, John.	36	Pratt & Letchworth.	126	Thomson-Houston Motor	56
Aschroff Mfg. Co.	6	Coburn & Drew.	14	Hammer & Co.	109	McNab & Harlin Mfg. Co.	38	Pratt & Whitney Co.	62	Ticonderoga, W. & Co.	103
Atlas, E. C. & Co.	76	Cockburn Barrow and	115	Hanson & Van Winkle Co.	84	Machinists' Supply Co.	69	Prentiss Tool & Supply Co.	61	Titcher, E. H. & Co.	103
Atlas Tack Corporation.	15	Machine Co.	115	Hardware Board of Trade	84	Machinists' Supply Co.	69	Presbury Stove Lining Co.	61	To, Wm. & Co.	58
Ausable Horse Nail Co.	71	Coes, Loring & Co.	110	Harrington, E. Son & Co.	56	Machinists' Supply Co.	69	Pullman, J. Wesley.	24	Toledo Block Works.	108
Avery Stamping Co.	12	Coes Wrench Co.	110	Harrington, E. Son & Co.	56	Machinists' Supply Co.	69	Pullman Sash Balance Co.	103	Toomey, Frank.	61
Baaskee Wire Nail Co.	71	Coffin & Leitch.	41	Hart, Henry C. Mfg. Co.	91	Machinists' Supply Co.	69	Quint, A. D.	98	Torrey, J. R. Co.	81
Babcock & Wilcox Co.	82	Colburn Wringer Co.	98	Hart Mfg. Co.	51	Machinists' Supply Co.	69	Quint, A. D.	98	Totten & Hogg Iron and	28
Bachus Mfg. Co.	82	Coldwell Lawn Mower Co.	113	Hartford Steam Boiler	32	Machinists' Supply Co.	69	Quint, A. D.	98	Tower & Lyon.	88
Bacon, Adamson & Co.	72	Colliat, Victor.	33	Harrison Safety Boiler	32	Machinists' Supply Co.	69	Quint, A. D.	98	Townsend, W. P. & Co.	119
Bailey, F. E. & Co.	68	Colins, W. S.	34	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Travers Bros. Co.	87
Bardsley, J.	104	Columbian Mfg. Co.	89	Haydon & Bissell.	91	Machinists' Supply Co.	69	Quint, A. D.	98	Trenton Iron Co.	4
Barnes, C. K. & Co.	23	Congdon Brass Shoe Co.	75	Hart Mfg. Co.	51	Machinists' Supply Co.	69	Quint, A. D.	98	Trenton Malleable Iron Co.	29
Barnes, W. F. & John.	79	Consolidated Steel & Wire	11	Hartford Steam Boiler	32	Machinists' Supply Co.	69	Quint, A. D.	98	Trimont Mfg. Co.	109
Barnett, G. & H.	79	Continental Iron Works	38	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Troy Nickel Works.	81
Becker, Jno. Mfg. Co.	44	Corning, Edw. & Co.	18	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Tyler & Dorsey Mfg. Co.	101
Belleville Steel Co.	1	Corning, Bradley W. & Co.	18	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Tyler Wire Wks. Co.	70
Belleville Pump Co.	1	Coulter & McKensie Mch.	47	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Underhill, Clutch & Co.	90
Bement, M. & Co.	47	Coverly Machine Co.	71	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Union Fdry & Mch. Co.	37
Bemis & Call Hdw. & Tool	109	Covert Mfg. Co.	105	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Union Hardware Co.	88
Berry Bros.	109	Cowles Electric Smelting	3	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Union Mfg. Co.	61
Berlin Iron Bridge Co.	38	& Aluminum Co.	3	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Union Metallic Cartridge	1
Berriman, Jas.	17	Cox, Justice, Jr.	23	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Unity Doo Check Co.	89
Bertsch & Co.	43	Crampton, J. & Sons S. &	23	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Universal Sadrin Co.	95
Bethlehem Iron Co.	43	E. B. Co.	3	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Valentine, M. D. & Bro.	29
Bethford Hollowsteel	109	Crescent Phosphorized	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Valley Pump Works.	39
Beyer Bros.	109	Metal Co.	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Van Dorn Iron Works Co.	8
Beyron Iron Bridge Co.	38	Crescent Steel Co.	25	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Van Wagoner & Williams	120
Beyron Bros. Mfg. Co.	90	Cresson, Geo. V. Co.	46	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Victor Mfg. Co.	103
Bicycle Step Ladder Co.	102	Croissant, M.	102	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Vulcan Iron Works.	81
Bidwell Geo. R. Cycle Co.	91	Cronk, Edw. & Sons.	45	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wadham Oil & Grease	36
Bigelow, C. R.	89	Crosby, G. & Co.	45	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wais & Roos Punch and	48
Bignall & Co.	89	Crosby Steam Gauge &	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waldo, Stout & Co.	48
Bignall & Spencer Co.	109	Valve Co.	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Walace, W. H. & Co.	35
Billingham, J. H. & Co.	35	Cross & Speirs Mch. Co.	42	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waltham Emery Wheel	68
Bingham, W. & Co.	111	Crown Smelting Co.	3	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wardlaw, S. & C.	20
Birmingham Iron Fdry.	26	Cruikshank, D. B.	61	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Warner Lock Co.	75
Blair Mfg. Co.	115	Cumberland Nail & Iron	10	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Washburn & Moen Mfg.	4
Blake & Johnson.	12	Curley, J. & Bro.	82	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waterbury & Sons.	62
Bliss Co., E. & Co.	83	Curtis, Gram.	30	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waterbury Brass Co.	70
Boardman, L. & Son.	83	Cushman Chuck Co.	51	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waterbury Farrel Foundry	43
Bogert, John L.	68	Dallett, Thos. H.	53	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Waterbury Machine Co.	40
Boger, Hermann & Co.	20	Dame, Stoddard & Kendall	30	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Watson & Stillman.	48
Bonnette Arc Law n	118	Dangler Stove & Mfg. Co.	80	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wayne, A. Mfg. Co.	101
Bosch, W. C. Mfg. Co.	22	Darby, Edw. & Sons.	89	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wayne, A. Mfg. Co.	101
Booth, The Lloyd Co.	39	Davis, Chas. & Co.	90	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Welland, Chas.	18
Borden & Co.	14	Davis & Cook.	83	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wellman Iron & Steel Co.	18
Borgner, Cyrus.	16	Davis I. B. & Son.	38	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wells Bros. & Co.	52
Boston Bridge Works.	29	Davis, W. P.	62	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Western Wheel Wks.	91
Boston Gear Works.	38	Davol, John & Sons.	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wetherill Bros. & Co.	20
Boston Lock'n'Block Co.	108	Day Metal Co.	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wetherill, Robt. & Co.	125
Box, Alfred & Co.	56	Dea, Bro. Co.	39	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whiting Steel & Iron Co.	22
Boynon & Plummer.	47	Deitz, A. E.	108	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	White & J. Co.	81
Bradley & Co.	125	DeKalb Fence Co.	8	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	White Mountain Iron	71
Bradley & Co.	125	Deming Co.	74	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitehead Bros. Co.	31
Bradley Fertilizer Co.	40	Detrick, M. H.	116	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitlock Coll Pipe Co.	34
Brady Mfg. Co.	68	Detrick & Harvey Mch. Co.	67	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitlock, Wm.	61
Brass Goods Mfg. Co.	2	Detroit Cork Screw Co.	83	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitman & Barnes Mfg.	78
Bridgeport Chain Co.	84	Detroit Foundry Equip	33	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitney, A. R. & Co.	19
Bridgeport Gun Imple-	80	ment Co.	33	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitney, A. R. & Sons.	61
ment Co.	80	Detroit Graphite Mfg. Co.	31	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Whitton, D. E. Mch. Co.	23
Briggs, Marvin.	62	Diamond Machine Co.	68	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wickwire Bros.	7
Bristol Mfg. Co.	78	Diamond State Iron Co.	106	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilcox & Howe Co.	105
Britton, Horace E.	82	Dieneit & Eisenhardt.	47	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wiley & Russell Mfg. Co.	50
Britton, J. Blodgett.	78	Diether & Barrows.	99	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	50123	
Broderick & Bascom Rope	6	Dieter, R. & Co.	79	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, Ed. C.	90
Co.	6	Dixon, Geo. & Son.	47	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, E. H. & Co.	19
Brown Supply Co.	100	Dixon, Jos. Crucible Co.	41	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, John.	80
Brown, E. H. & Co.	104	Donaldson Iron Co.	28	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, J. Fred.	119
Brown Hoisting & Con-	72	Doscher, Martin.	81	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, W. A.	46
veying Machine Co.	40	Douglas, W. B.	74	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wilson, W. A. & Co.	114
Brown, R. H. & Co.	70	Dudgeon, Richard.	49	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Winstow Sm't, State Mfg.	90
Brown & Sharpe Mfg. Co.	60	Dunbar Bros.	5	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wire Goods Co.	8
Byrdon Horse Shoe Co.	106	Dunbar Bros.	5	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wister, Francis.	29
Buchanan Fence Co.	117	Dupont Mfg. Co.	44	Hart Works	32	Machinists' Supply Co.	69	Quint, A. D.	98	Wister, L. R. & Co.	23
Buck Bros.	89										

# THE IRON AGE

THURSDAY, MARCH 16, 1893.

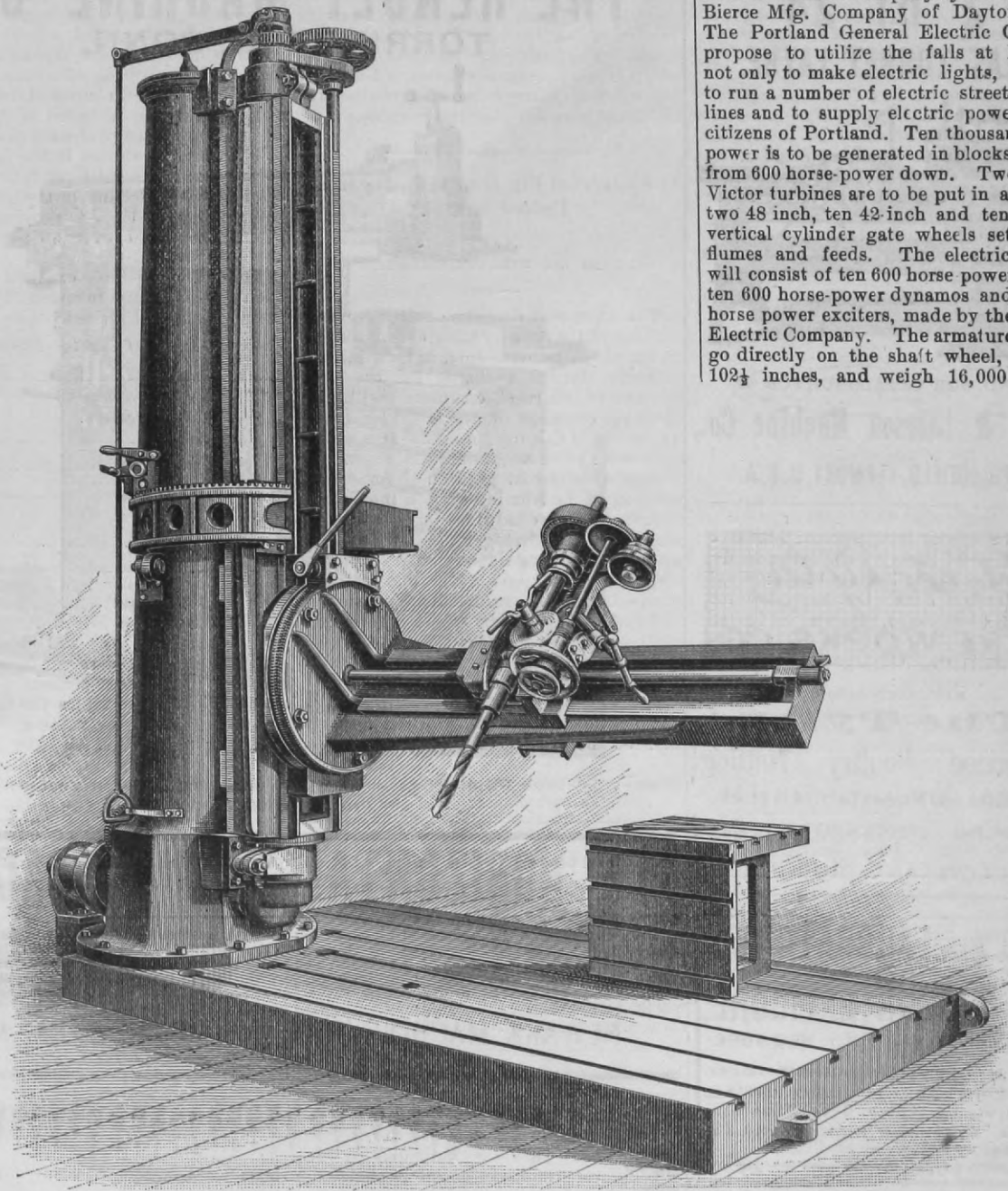
## The Warren Universal Radial Drill.

The William H. Warren Machine Tool Works of Worcester, Mass., recently shipped a 10 foot universal radial drill, embodying several new features. One of the most important details is to be found in the method of holding the arm rigid on

as accurate work. The post is mounted to turn on hardened steel balls, it being free to turn when the latch shown at the left of the engraving is raised. The base of the machine is 73 inches wide, 11 feet long and 7 inches deep. When the spindle is in its highest position it is 10 feet from the top of the table to the nose of the spindle. The extreme radius of drilling

to overcome by his method the drawbacks incident to the crystalline and loose nature of electrically deposited coats of copper.

**The Portland Electric Water-Power Plant.**—What promises to be one of the most elaborate water-power plants in the world is now in process of erection at Portland, Ore. It is put in for the Portland General Electric Company by the Stilwell & Bierce Mfg. Company of Dayton, Ohio. The Portland General Electric Company propose to utilize the falls at Portland not only to make electric lights, but also to run a number of electric street railway lines and to supply electric power to the citizens of Portland. Ten thousand horsepower is to be generated in blocks ranging from 600 horse-power down. Twenty-two Victor turbines are to be put in at once—two 48 inch, ten 42-inch and ten 60-inch vertical cylinder gate wheels set in iron flumes and feeds. The electrical plant will consist of ten 600 horse power motors, ten 600 horse-power dynamos and two 400 horse power exciters, made by the General Electric Company. The armatures, which go directly on the shaft wheel, measure 102½ inches, and weigh 16,000 pounds,



THE WARREN UNIVERSAL RADIAL DRILL.

angular or horizontal drilling and vertical boring. In the inner end of the arm is a worm gear, with which engages a worm operated by the ratchet handle shown. This construction permits of turning the drilling tool to any desired angle and of holding it firmly in place. Another modification of value is the large bearing surface of the arm on the guides of the post. This obviates the necessity of tightening the grip bolts on surface drilling, thereby saving much time, in comparison with the ordinary drill, in doing

is 192 inches and the shipping weight 22,000 pounds.

A very neat method for coating sheet steel with copper is being developed by W. B. Hollingshead of Bronxville, N. Y. He deposits copper electrically and then rolls the sheet. Upon this he deposits a second coat and rolls it again, or works it under a planishing hammer. Some fine specimens of sheets thus coated have been made, opening a promising future for the material. Mr. Hollingshead aims

and make 200 revolutions per minute. No belting of any kind will be used in the plant. The waterfall has a head of 42 feet, but as at times the river has been known to rise so high as to considerably diminish this head, A. C. Rice, general superintendent and consulting engineer of the Stilwell & Bierce Company, who prepared the plans for this important plant, has devised a very ingenious method of overcoming this difficulty by putting in a separate wheel to be used when there is a serious rise in the river.

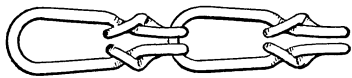


### The Strength of Small Chains.

In a paper read at the meeting of the British Association at Edinburgh, in 1892, Professor H. S. Hele-Shaw states that he has frequently found the result of using small chain most unsatisfactory. In the first place, no small chain which he has been able to procure seemed to give a reasonable amount of strength in proportion to its weight and the tensile strength of the material. In the second place, no maker will usually give any guarantee of strength below a certain size, generally  $\frac{3}{8}$ -inch, although in some special cases makers will guarantee the strength as low as  $\frac{1}{2}$  inch. Below  $\frac{1}{2}$  inch no strengths are ever quoted in text books, engineering pocket books, or books of engineering reference.

Commenting on data found in engineering works, the author says that these data are not very satisfactory in themselves, and there are no results of chain of less than  $\frac{3}{8}$  inch diameter; whereas enormous quantities of chain under this size are made and sold.

Recently there have been a number of tests on the strength of small chains in the Walker engineering laboratory. These tests include all sizes of chain up to  $\frac{1}{2}$  inch



The Triumph Chain.

diameter that could be bought or procured either in shops or from wholesale makers.

The result of these tests is given in five tables, under the following heads: Single Jack, Double Jack, Ordinary Welded, Triumph (American), shown in the engraving, and Miscellaneous (brazed and odd size welded). Of these we print the two most interesting:

English Welded Chain.

Maker's size.	Diameter, inches.	Area, square inches.	Strength in pounds.			Average strength in pounds.
			Test I.	Test II.	Test III.	
13.....	0.095	0.00709	295	369	369	344
10.....	0.127	0.0126	546	535	537	539
9.....	0.146	0.0167	633	598	624	618
6.....	0.155	0.0188	1,097	920	1,164	1,060
5.....	0.181	0.0257	1,214	1,256	1,181	1,217
4.....	0.223	0.039	2,226	1,711	2,038	1,991
3.....	0.352	0.0108	2,826	2,735	2,694	2,751
2.....	0.266	0.0555	3,339	3,933	3,158	3,476
1.....	0.283	0.0629	4,204	3,652	4,403	4,154

American Triumph Chain.

Maker's size.	Diameter, inches.	Area, square inches.	Strength in pounds.			Average strength in pounds.
			Test I.	Test II.	Test III.	
7.....	0.058	0.0022	284	286	280	283
6.....	0.057	0.00255	322	322	320	321
5.....	0.068	0.00363	408	428	448	428
4.....	0.071	0.00395	506	497	474	492
3.....	0.084	0.00554	601	681	698	676
2.....	0.120	0.0113	1,290	1,281	1,315	1,295
00.....	0.135	0.0143	1,046	1,590	1,508	1,401
000.....	0.149	0.0174	1,990	2,000	2,049	2,015
4-0.....	0.164	0.0211	2,464	2,522	2,607	2,531
5-0.....	0.178	0.0248	2,927	2,976	2,950	2,951
6-0.....	0.22	0.038	3,772	3,801	3,747	3,773

In every size three tests of ultimate strength were made, the results of which, in pounds, have been recorded, the average being given in another column. The want of uniformity in results is sufficient to explain why no values for strength are

given by the makers and why the recorded results in books differ so much.

The chief effect to be noticed is the extraordinary strength of the new American chain, which, on an average, is twice as strong for every corresponding size as the English welded chain; five times as strong as the double jack chain, and eleven times as strong as the single jack chain, and, in every case, gave way, not as in the case of the jack chain and welded chain at the joints, but in the material itself.

A further experiment was made of twisting a piece of iron wire into the form of the American link, and then testing the link and afterward the wire itself, when it was found that the strength of the link was about  $1\frac{1}{2}$  times the strength of a single section of the iron wire from which it was made. The author understands that this chain is not yet manufactured in England, but steps are being taken to introduce the machines necessary for the purpose.

### The Charcoal Pig-Iron Industry in the United States.\*

BY DR. WILLIAM SWEET.

The abundant deposits of iron ores in sections of the country remote from sources of supply of mineral fuel, but containing extensive forests available for the production of charcoal, combined with the excellent character of the metal produced by the use of this fuel, are influences which have resulted in maintaining for the manufacture of charcoal pig iron an important position in the iron industry in the United States. These conditions are especially prominent in Michigan and Wisconsin, which States contain not only enormous beds of rich iron ores, but also vast tracts of woodland. The former State uses charcoal fuel exclusively in its blast furnaces, and produced in the census year 1890 over one-third of all the charcoal pig iron made in the United States during that period.

The following table is a comparative statement of the charcoal pig-iron industry for 1890 and 1880:

Table 1.—Comparative Statement of Charcoal Blast Furnaces: 1890 and 1880.

General heads.	1890.	1880.
Number of establishments.....	119	223
Amount of capital invested.....	\$20,068,715	\$27,909,919
Average number of hands employed.....	3,314	16,900
Amount of wages paid.....	\$1,205,061	\$4,143,551
Cost of materials used.....	8,396,130	7,403,561
Value of products.....	11,985,103	12,575,996

\* Excludes officers or firm members, clerks or salesmen, and their salaries.

Notwithstanding the apparent decline from 1880 to 1890, as indicated by the above figures, the manufacture of charcoal pig iron has shown a considerable growth during the past decade, the production increasing from 435,018 net tons in 1880 to 664,497 net tons in 1890, or 52.75 per cent. The decline shown in the number of establishments arises from the fact that many of the small charcoal furnaces included in the presentation for 1880 have been abandoned and fewer but much larger and better equipped stacks erected in locations more favorably situated for securing an abundance of low-priced materials. The apparent decrease in capital invested, hands employed and wages paid is caused by the different methods pursued in compiling the data for the two census periods. The statistics for 1880 include not only

\* From the Census Bulletin, issued March 6.

the investment in blast-furnace plants and machinery and the labor directly employed in pig-iron production, but also the capital invested, hands employed and wages paid in mining and other operations conducted in connection with these works. Notwithstanding this fact, the cost of the materials reported was apparently the cost at the furnace. There is a duplication to this extent in the cost of production, and this accounts in a measure for the inconsistencies in the figures published by the Tenth Census. In order that the census for 1890, so far as practicable, should show the statistics of the manufacture of pig iron separate from other industrial operations the statistics for that year relating to iron ore mining, limestone quarrying, charcoal burning, and other similar industries dependent on the manufacture of pig iron have been eliminated from the tabular statements contained in this report, this data being included in the statistics of other branches of census investigation.

The decrease shown in the table in the total value of finished products is caused wholly by the decline in the price of pig iron, the production, as previously stated, having increased over 50 per cent. from 1880 to 1890.

The following table exhibits separately the items of capital invested in 1890, with the percentage of increase or decrease.

Table 2.—Items of Capital Invested in 1890.

Classification.	Invested capital.
Buildings, machinery, tools, &c.....	\$9,143,800
Land.....	2,020,317
Cash and stock on hand.....	8,904,598
Total.....	\$20,068,715

Of the 119 establishments reported in 1890 35 remained idle during the census year, while 99 of the 223 establishments reported in 1880 were not in operation at any time during that period.

In the foregoing tables the total capital invested includes the value of both active and idle plants, and also the amount expended on seven plants during 1890, which were in course of construction. The separate items for each class of works are shown in the accompanying table:

Table 3.—Distribution of Capital Invested in Active and Idle Plants and those in Course of Construction: 1890.

Classification.	Aggregate capital.	Works in operation.	Works idle.	Works building at close of census year.
Buildings, machinery, tools, &c.....	\$9,143,800	\$7,502,251	\$1,428,150	\$215,399
Land.....	2,020,317	1,680,963	292,454	46,900
Cash and stock on hand....	8,904,598	8,570,347	374,251	.....
Total.....	\$20,068,715	\$17,713,561	\$2,092,855	\$262,299

### Labor and Wages.

The number and salaries of officers or firm members and clerks or salesmen are omitted from the summary of hands employed and wages paid in 1890, as was probably done in compiling the figures for 1880. As the statistics for 1890 refer only to the labor directly employed at the charcoal blast furnaces, an accurate comparison of the data for the two census periods is impossible.

The following table shows the number and salaries of officers or firm members and clerks or salesmen and the average

number and wages of skilled and unskilled workmen employed in the charcoal pig iron industry in 1890:

hot and cold blast charcoal pig iron and the quantity and value of castings and other products made by charcoal furnaces

included the statistics of Kentucky, Maine, Massachusetts, North Carolina, Oregon and Washington. This grouping has been rendered necessary in order that the operations of individual plants may not be disclosed, none of the States above mentioned containing more than two establishments. During the decade from 1880 to 1890 the charcoal blast-furnace establishments in Kentucky declined in number from 15 to 2, those in Massachusetts from 3 to 2, and those in North Carolina from 5 to 1. Maine and Oregon had one establishment in each year, while the establishment located in the State of Washington commenced operations during the past decade. Since 1880 the manufacture of charcoal pig iron has been abandoned in Indiana, Minnesota, Vermont, West Virginia and Utah, although Indiana, Minnesota and West Virginia continue to manufacture pig iron with mineral fuels. A charcoal blast furnace was put in operation

Table 4.—Classification of Labor Employed and Wages Paid: 1890.

Classes.	Aggregate.		Males above 16 years		Females above 15 years.		Children.	
	Average number employed.	Total wages paid.	Average number employed.	Total wages paid.	Average number employed.	Total wages paid.	Average number employed.	Total wages paid.
Officers or firm members	144	\$280,723	144	\$280,723				
Clerks or salesmen	117	74,222	115	73,562	2	\$360		
Skilled workmen	824	421,752	824	421,752			9	\$1,435
Unskilled workmen a.	2,490	783,309	2,481	781,874				
Total a.	3,575	\$1,560,008	3,564	\$1,557,911	2	\$660	9	\$1,435

a Includes convict laborers at the Texas penitentiary, receiving an average of 50 cents per day.

The following statement exhibits the weekly rates of wages paid and the average number of hands employed at each rate during the census year 1890, exclusive of officers or firm members and clerks or salesmen:

Weekly Rates of Wages and Average Number of Hands Employed at Each Rate: 1890.

Rates per week.	Classes.	
	Males.	Children.
Under \$5 a.	88	4
\$5 and over, but under \$6.	105	5
\$6 and over, but under \$7.	418	
\$7 and over, but under \$8.	683	
\$8 and over, but under \$9.	676	
\$9 and over, but under \$10.	448	
\$10 and over, but under \$12.	433	
\$12 and over, but under \$15.	275	
\$15 and over, but under \$20.	97	
\$20 and over, but under \$25.	36	
\$25 and over.	46	
Total a.	3,305	9

a Includes convict laborers at the Texas penitentiary, receiving an average of 50 cents per day.

During the census year 1890 the charcoal furnaces were in operation an average of 8.04 months each; the average term of employment for men was 8.97 months and for children 7.50 months. The excess of the average term of employment over the average term of operation is due to the fact that the works reporting the maximum term of operation also report the largest number of hands. Furnace hands were employed 12 hours per day, seven days each week, while yard hands worked ten hours daily for six days of the week. In 1880 the charcoal furnaces were in operation an average of 6.45 months each during the year.

Materials Consumed.

The following table shows the quantity and cost of the various materials consumed by charcoal blast furnaces in 1890 and 1880, the iron ore and fluxing materials being stated in tons of 2000 pounds:

Table 5.—Quantity and Cost of Materials Consumed: 1890 and 1880.

Materials.	1890.		1880.	
	Quantity.	Cost.	Quantity.	Cost.
Domestic iron ore, tons.	1,295,880	\$3,607,242	942,051	\$3,535,629
Foreign iron ore, tons.	9,082	37,236	116,667	100,569
Fluxing material, tons.	153,183	159,179	53,903,228	3,678,658
Charcoal, bushels.	67,772,136	4,523,320		
All other materials, including mill cinder, scrap, &c.		69,153		88,675
Total		\$8,396,130		\$7,403,531

Products.

The following comparative table shows the quantity and value at the furnace of

during 1890 and 1880, the quantities being stated in tons of 2000 pounds:

Table 6.—Quantity and Value of Products: 1890 and 1880.

Products.	1890.		1880.	
	Tons.	Value.	Tons.	Value.
Hot or warm blast charcoal pig iron.	627,661	\$11,238,239	355,405	\$10,080,581
Cold-blast charcoal pig iron.	36,836	714,241	79,613	2,393,175
Castings.	204	4,680	300	14,988
Value of all other products.		27,743		87,252
Total.	664,701	\$11,985,103	435,318	\$12,575,996

It will be observed that the increase in tonnage in the ten years was entirely in hot or warm blast pig iron, the production of cold-blast iron showing a decline of 53.73 per cent.

Grand Aggregate by States.

The following table exhibits by States the aggregate number of establishments,

in California in 1881, but it was abandoned prior to the census year 1890.

The thirtieth annual report of the Boston Manufacturers' Mutual Fire Insurance Company, at the head of which is Edward Atkinson, while C. J. H. Woodbury is vice-president, has just been issued to

Table 7.—Statement, by Totals, for Each State and Territory: 1890.

States and Territories.	Number of establishments.	Capital invested.	Average number of hands employed. a	Wages paid. a	Cost of materials.	Value of products.
Alabama	12	\$3,434,029	666	\$222,969	\$1,311,704	\$1,940,875
Connecticut	7	1,068,392	117	50,634	412,743	574,438
Georgia	3	347,275	81	6,015	60,091	96,598
Maryland	5	727,650	122	41,487	221,887	333,603
Michigan	21	5,689,701	675	321,022	2,432,233	3,982,278
Missouri	3	636,295	244	105,183	347,369	525,481
New York	7	1,104,344	72	31,089	248,424	332,063
Ohio	10	823,094	256	60,661	309,235	445,106
Pennsylvania	15	897,808	201	37,152	299,821	401,448
Tennessee	6	981,520	201	80,493	432,838	664,916
Texas	3	93,500	c 72	c 10,975	85,000	173,000
Virginia	13	531,400	101	22,104	99,972	169,830
Wisconsin	6	1,268,331	267	129,733	1,083,833	1,494,775
All other States	8	2,153,376	239	85,544	550,930	851,692
Total	119	\$20,062,715	3,314	\$1,205,061	\$8,396,130	\$11,985,103

a Excludes officers or firm members, clerks or salesmen and their salaries.

c Includes convict laborers at the Texas State penitentiary, receiving an average of 50 cents per day.

capital invested, hands employed, wages paid, cost of materials and value of prod-

members. The showing is an excellent one, the amount at risk at the end of the year having risen to \$98,148,909, an increase of \$4,619,918 during the year. The total premiums received were \$788,735.72, to which there was added interest receipts of \$33,460.57, making a total income of \$822,196.29. The losses incurred during the year were \$58,383.27, and there were returned premiums aggregating \$600,698.72. The assets in cash and securities foot up to \$794,720.17, against which there are liabilities of only \$4626 51.

In one of the numerous suits brought by the National Harrow Company against the patrons of the Clipper Chilled Plow Company of Elmira, New York, Judge Cox of the United States Circuit Court decided in favor of the defendant and dismissed the case.

ucts of the charcoal pig-iron industry for 1890.

Under the head of "All Other States," are

### Proportioning a Compound Air Compressor.

In all compound compressors the relative cylinder volumes are a matter of vital importance, it being essential to the attainment of the best results that the work be equally divided among the several operations. It is obvious, therefore, that the proportions must be made to conform to a given pressure, and that the machine can only work to best advantage at or very near to that pressure. By the following formulæ all of the calculations necessary for designing a compound compressor, and for ascertaining the power of the engine or other motor required, may be made—the volume of air per minute, and the desired pressure, being the only necessary given quantities. For triple compression—say, 960 pounds:

Let  $P$  = low pressure terminal and medium pressure initial, above vacuum,  $= R \times N$ .

$P'$  = medium-pressure terminal and high-pressure initial, above vacuum,  $= R^2 \times N$ .

$P''$  = high-pressure terminal above vacuum (given), 960 pounds,  $= R^3 \times N$ .

$N$  = normal or atmospheric pressure above vacuum—say, 15 pounds.

$R = \sqrt[3]{\frac{P''}{N}}$  = ratio of areas of the three cylinders, or equivalent; also proportion of piston travel to reach maximum pressure in each cylinder.

$S$  = stroke of piston in feet.

$T$  = travel of piston in feet, after maximum pressure is reached,  $= \frac{S}{R}$

$A$  = equal area of low-pressure piston.

$a$  = area of medium-pressure piston.

$a'$  = area of high-pressure piston.

$D'$  = diameter of high-pressure cylinder  $= \sqrt{\frac{A \div R^2}{0.7854}}$

$H$  = hyperbolic logarithm of  $R$ .

$M L P = \frac{P \times (T \times 1 + H)}{S}$  or  $P \frac{1 + H}{R} =$  mean low pressure above vacuum.

$M M P = \frac{P' \times (T \times 1 + H)}{S}$  or  $P' \frac{1 + H}{R} =$  mean medium pressure above vacuum.

$M H P = \frac{P'' \times (T \times 1 + H)}{S}$  or  $P'' \frac{1 + H}{R} =$  mean high pressure above vacuum.

For double compression the formula for value of  $R$  will be  $R = \sqrt{\frac{P''}{N}}$

By way of illustration, we may assume a three-cylinder triple compression machine of capacity for 20 cubic feet of air per minute, delivered to receiver at a pressure of 960 pounds above vacuum, or 945 pounds above atmospheric pressure.

First finding the ratio, by  $R = \sqrt[3]{\frac{P''}{N}} = 4$ , we ascertain the volume of free air required to be  $20 \times R^3$ , or 320 cubic feet. Assuming, say, 64 revolutions as the speed of compressor (single acting), we have  $\frac{320}{64} \times$

$1728 = 8640$  cubic inches per stroke, which—neglecting the very small percentage of clearance—is also the volume of cylinder, or more correctly, the piston displacement for first compression. Calling the stroke 24 inches, we have  $\frac{8640}{24} = 360$  square

inches area or 21.41 inches diameter. The second or intermediate cylinder is  $\frac{360}{4} =$

90 square inches; and the area of small cylinder will be  $A \div R^2 = 360 \div 16 = 22.5$  square inches, the diameter being 5.35 inches. So much as to dimensions. Calculating the pressures, we have for first compression  $P = R \times N = 15 \times 4 = 60$  pounds. For second compression  $P' = R^2 \times N = 16 \times 15 = 240$  pounds; and for final pressure  $P'' = R^3 \times N = 64 \times 15 = 960$  pounds, as given. These pressures, of course, are the terminals for the cylinder in which they were produced, and also the initial of the succeeding one. The mean pressures throughout the stroke are, respectively,

$P \frac{1 + H}{R} = 60 \times \frac{1 + 1.3863}{4} = 35.8$  pounds, low pressure;  $P' \frac{1 + H}{R} =$

$240 \times \frac{1 + 1.3863}{4} = 143.2$  pounds medium pressure; and  $P'' \frac{1 + H}{R} =$

$960 \times \frac{1 + 1.3863}{4} = 572.7$  pounds mean high pressure. If we now multiply

these pressures by their respective areas, we should find them to correspond exactly, save for the slight discrepancy caused by decimal remainders. Then 35.8 pounds  $\times$  360 square inches = 12,888 pounds;  $143.2 \times 90 = 12,888$ ; and  $572.7 \times 22.5 = 12,885.75$  pounds. The formula for value of  $R$ , for quadruple compression, then

becomes  $\sqrt[4]{\frac{P''}{N}} = 2.8284$ ; and by it the areas are: First, 360; second, 127.3; third, 45; and fourth, 15.91 square inches. The terminal pressures, by  $R \times N$ ,  $R^2 \times N$ , &c., are: First, 42,426; second, 120; third, 339,408; and fourth, 960 pounds. The hyperbolic logarithm of 2.83 is 1.03, and by formula  $P \frac{1 + H}{R}$  &c., we have

the mean pressures—first, 30.449; second, 86,124; third, 243.59; and fourth, 688.99 pounds. The mean total pressures (areas  $\times$  mean pressures) are: First, 10,962; second, 10,963.6; third, 10,961.6; and fourth, 10,964 pounds. It will be understood that these figures are used simply by way of illustrations, as for 960 pounds pressure the two cylinders will perform

the duty without difficulty. By  $\sqrt{\frac{P''}{N}}$  we have  $R = 8$ , and the areas become 360 and 45 square inches respectively. The terminal pressures are  $\frac{960}{8} = 120$  and 960 pounds;

and the mean pressures,  $120 \times \frac{1 + 2.079}{8} = 46,175$ ; and  $960 \times \frac{1 + 2.079}{8} = 369.4$  pounds.

To apply the formula for proportions to the trunk piston compressor, it is necessary to ascertain the diameter of trunk, whose area, subtracted from that of the cylinder, must give the value of  $a$ .

Let  $D$  = diameter of trunk; then  $D = \sqrt{\frac{A - a}{0.7854}}$ . For quadruple compression, the diameter of trunk in second cylinder will be  $D' = \sqrt{\frac{a' - a''}{0.7854}}$ , in which  $a'$  = area of piston for third compression, and  $a''$  = that for fourth compression.

For all practical purposes of air compression the single cylinder compounding is sufficient, and it is only in such operations as the liquefaction of gases, in which excessively high pressures are required, that it becomes necessary to resort to the triple or quadruple compression, as described.

### Hydraulic Machinery and Heavy Guns.

According to the *London Times* the late very cold weather in England has had a disastrous effect on the hydraulic machinery for the heavy guns on board the "Benbow," a first-class armored battleship which has been lying at Chatham Dockyard for some time past with a complement of officers and men presumably supposed to be sufficient for the care and preservation of the vessel and her armament.

Although not one of the very latest in date of building, having been launched in 1885, this vessel is one of the group of powerful modern battleships upon the efficiency and thorough readiness of which great dependence would have to be placed should Great Britain become involved in a maritime war.

The "Benbow" has a displacement of 10,600 tons, is credited with 11,500 indicated horse-power, has a speed record of 17.5 knots, and carries a main battery of 12 guns, of which ten are 6 inch breech-loading rifles, and the other two, also breech-loading rifles, are 111-ton guns worked by hydraulic power.

These enormous guns belong to a class which has given the English naval authorities a good deal of trouble, owing to their tendency to droop at the muzzle and to other causes. The caliber of the guns is 16½ inches, the weight of the projectiles is 1800 pounds and the charge of powder weighs about 900 pounds.

When it was realized that serious injury had resulted from the unusually low temperature prevailing recently, a careful examination of the hydraulic machinery was made by the dockyard force, with the result that it has been found necessary to take apart the greater portion of this machinery and forward it to the firms by whom it had been supplied, for reconstruction and repair.

This incident suggests the possibility, as has been pointed out by Admiral of the Fleet Sir Thomas Symonds, in a letter to an English military journal, that the best ships of the British Navy, as at present fitted, are not suitable for service in such waters as the Baltic, a condition which might lead to serious embarrassment, or possibly to disaster.

About 25 of the British battle ships carry monster guns needing more or less delicate and complicated machinery. Sir Thomas Symonds calls attention to the fact that numerous accidents have happened from time to time in connection with the use of this machinery, and that there are many disadvantages inseparable from the use of very heavy guns, which cannot, as a rule, be fired right ahead or astern, point blank, without wrecking the deck. He urges, therefore, that these excessively heavy guns should be put on shore and that they should be replaced by a suitable number of lighter ones, such as the 10-inch 29-ton guns which are to be the heaviest included in the armament of the powerful British battle ship "Centurion," now building.

The navy gets three gunboats as the result of the conference at Washington on the Naval Appropriation bill. The House provided for only one and the Senate provided for four. The gunboats are to be about 1200 tons displacement each, and to cost, exclusive of armament, within \$400,000 each. A speed of 17 knots per hour must be attained. The Secretary of the Navy is prohibited from receiving bids from any party not provided with a plant suitable to do the work. In the event of the Secretary being unable to contract at reasonable prices for the building of these vessels, he is authorized to build the boats at any of the navy yards.



## Screw Propeller.

### Easy Method of Measuring the Pitch.

All well educated marine engineers concede that there is to-day less accurately known about the efficient action of the screw propeller than about any other portion of a ship's machinery. This is frequently a source of surprise to superficial observers, as well as one of annoyance to those in the profession, who, wishing to particularly study the subject, fail to find reliable and desirable data to work upon.

Its theory, pure and simple, has been ably written up by men prominent in the engineering field; yet so difficult is the subject to elucidate, and so meager are the well-established facts pertinent to the

element, some asserting that the pitch should be expanding fore and aft—that is, that the pitch of the leading edge and half of the blade should be greater than that of the trailing half. Others advocate the adoption of a screw whose pitch shall be greater at the hub portion of the blade than it is at the periphery, while excellent reasons are advanced in support of the opposite view to this, declaring that the proper pitch should expand from periphery to hub. The weight of theory probably points to an expanding pitch, yet, practically, we seem to be tending toward the general adoption of a screw with uniform pitch—a true screw. Of course when such a screw is designed with movable blades, there is only one position in which these blades will be a true screw—a fact frequently lost sight of by most build-

than useless, as they only serve to mislead the investigator.

The surface of the blades can easily be gotten, by spreading paper over their driving faces, in convenient sections, and thus obtaining a pattern which can be measured at leisure; but the pitch, especially when a screw is in position, must be obtained under difficulties, and hence is often done in a careless and incorrect manner.

To those interested in this matter, the following method is suggested as being simple and free from the inaccuracies attending most of the usual practices. The preliminary work occupies but about an hour, yet it is the principal part of the entire operation, while the result is so satisfactory as to amply repay the operator. Frequently five or six hours are spent in unsuccessful attempts to measure the pitch of a screw correctly, and it does not require much consideration to enable one to realize the advantages of a proper and ingenious preparation.

The ship being in dry dock, and access to the propeller provided by ladder or staging, it is first necessary to have the forward face of the hub A, Fig. 2, and that portion of the shaft between this face and the stern post or after bearing, thoroughly scraped clean. Then carefully caliper the diameter of the shaft and also the hub at a distance of 1 inch from the face, at C D. Measure roughly the distance from the root of the blade to its tip, and with these several dimensions proceed to the carpenter shop of the dock yard, or on board ship, where have made a span and square, as follows: Lay down, on a smooth floor or board, the shaft circle, and from the same center also strike the hub circle, as found; then to the back of a piece of  $\frac{1}{2}$  inch white pine, 6 inches wide and a trifle longer than the blade measure, attach firmly two white pine legs (2 inches wide by  $\frac{1}{4}$  inch thick) in such a manner that they will be exactly tangent to the shaft circle when the bottom of the

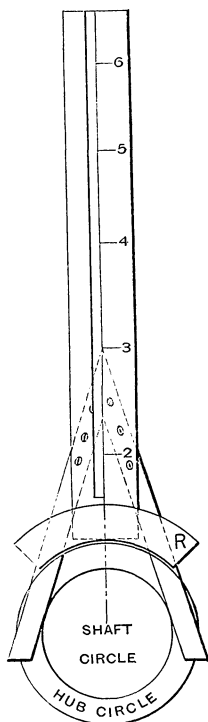


Fig. 1.

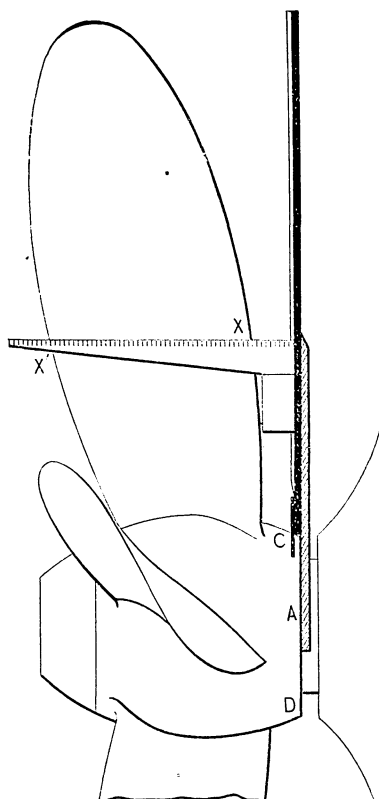


Fig. 2.

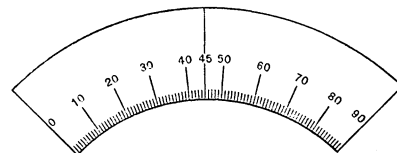


Fig. 3.

### SCREW PROPELLER.—EASY METHOD OF MEASURING THE PITCH.

confirmation of the theory, that it is impossible to design with absolute certainty a screw which shall, for a given hull, prove most efficient. Indeed, this has become so generally recognized among builders of marine machinery as to make it quite the common practice to cast the blades of propellers separate from their hubs, bolting them on afterward, and having in view not only the obvious economy of such an arrangement in event of the breaking of a blade (when a new blade instead of a new propeller would be alone necessary), but also the possibility of readily readjusting the pitch should the results of a first trial indicate an advantage in so doing.

The size of the blades—that is, the area of their driving faces, can be pretty closely calculated; but it is in the disposing of this area to the best advantage that the doubt comes in. This is plainly shown by the great number of differently shaped screws now in use, and also by the almost infinite variety not in use, but the models of which one can see in the Patent Office.

The question of pitch is especially an open one, and volumes have been written advocating the various arrangement of this

ers, but readily demonstrated, geometrically; but it may be that in reconciling these shifted blades to increased efficiency, new light will be shed on the rather dark subject.

What we most desire and require at the present time is a series of extensive experiments, carried out with greatest care and upon the lines having the best support. These, of course, would be very expensive and beyond the means of private enterprise, but the general Government could well afford to conduct them for the general good. Until such an undertaking shall have become a fact, however, much valuable information may be gotten from records of our large steamers, if only the engineers will take an interest in observing and carefully noting the conditions under which the several voyages are made, together with all obtainable data concerning the propeller, hull and power developed by the main engines, tabulating them and sending them for publication.

In collecting all this, accuracy is most essential, especially as to the propeller, and in this way errors are more frequently made than in measuring the pitch. If this is wrong the other notes are worse

board is just above the hub circle, Fig. 1. Secure the apparatus temporarily in this position, while with a chalk line a radial from the center is marked up the middle portion of the board, and along this line, leaving it just clear, tack a straight  $\frac{1}{4}$  inch batten. Mark on this radial the distances in feet from the center, say 2 feet, 3 feet, 4 feet, &c., as points from which to measure the pitch. Now, with a radius equal to the hub circle, C D, mark on a thin piece of board a quadrant and divide it into degrees by a protractor or by stepping it off, and saw out this, as shown, Fig. 3. This piece R must be secured to the span, as shown in Fig. 1. A common wooden square, with rather wide back and one side flush to bear against the batten, completes the implements needed, this square being marked in inches and eighths from the base outward, as we do not wish to be trammelled with tape line or rule when at the hub.

Being now ready for rapid work, let us measure the pitch at one point to show the application, say at the 4-foot radius.

Place the span on the shaft, where it will rest on its tangent legs, and press it closely against the forward face of the hub.

Swing it so that the square, when placed in position, with its base at the 3-foot mark and bearing on the radial batten, will just touch the forward edge of the blade X. Make a mark at this point, noting its distance from the board, on square scale, and also scratch a mark on the hub opposite the 0 mark of the quadrant. Now move the span around so that the square when again adjusted will just touch the after edge of the blade. Note the distance of this point, X', from the board, and also read off the number of degrees the quadrant has moved through. These measurements give us the data for the pitch at this point. Say the distance from board to X was 4 inches, and of X' was 24 inches, also that the quadrant showed a movement of 30°. We here have an advance of 20 inches in one-twelfth of a revolution, or a pitch of 12 times 20 inches in the complete revolution, or 20 feet. Before we leave this point we lay the straight edge of our square across the blade from X to X', and if the blade does not bear on this line, but is distinctly hollow from it, we have an expanding pitch fore and aft, and we add double the amount of hollow to the advance found, from which we calculate the pitch of the after half of the blade at this point, and subtract double the hollow from the same advance, from which to calculate the entering pitch. Of course, no calculations are done at the hub, only notes taken of the marks at the different points, so that there need not be any great length of time taken to secure all the required data.

## WORLD'S FAIR NOTES.

### The Forestry Exhibit.

Out on the lake shore, near the southern extremity of the World's Fair grounds, is a structure that differs materially from any other in the park. The Forestry Building is *sui generis*. After seeing the magnificence of staff construction in the large buildings it may be with relief that some visitors will turn to the rustic simplicity of the forestry building. Instead of the intricate work of designers, molders or artists, the highest effects in the forestry building come from groupings of natural woods. No other building on the ground shows so clearly at first impression the uses for which it is designed.

The scope of the World's Fair forestry exhibit is of peculiar interest to Americans. When a separate department of forestry was created, it was pointed out that the opportunity had arrived to make constructive forestry as important a science in this country as in Europe. On this idea the fair managers have worked with a will. Although constructive forestry and the restoration and preservation of forests are yet in their infancy in America, it is believed that the turning point has arrived and that the World's Fair exhibit will have a most potent influence in preventing the further wholesale destruction and waste of native forests.

The Forestry Building itself is the main exhibit in the department. It is 200 x 500 feet in area. On all four sides is a veranda, with supports forming an imposing colonnade. This colonnade is one of the most unique affairs ever designed and is peculiarly appropriate to a cosmopolitan fair. It is built from woods contributed by foreign countries and about 30 States and Territories. It consists of a series of columns, each composed of three tree trunks 25 feet long. One of the trunks in each column is from 16 to 20 inches in diameter at the base and the other two are from 9 to 12 inches. All the trunks have the natural bark of the tree. Each of the States, Territories or foreign countries furnishes specimens of the most character-

istic timber growths within its borders. The sides of the Forestry Building are built of slabs with the bark removed. The rest of the building, including the window frames, has the same rustic treatment. The roof is thatched with tan and other barks.

The main entrances are finished in different kinds of wood and are very elaborate. The one on the east side, facing the lake, deserves special mention. It is put in place and finished by the Southern Lumber Manufacturers' Association. The vestibule is of yellow pine and cypress. It is built in such a way as to show the susceptibility to polish of the Southern woods and their usefulness for panels and interior decorations. The cost of this main vestibule alone was between \$5000 and \$10,000. Some of the States—Alabama, for instance—have sent tree trunks for the Forestry Colonnade, although prohibited from making an interior exhibit by lack of appropriations. The tree trunks in the columns taper toward the top and are joined by rustic work in longitudinal sections. Some of the latter are also furnished by the States contributing the columns. On each column there will be a tablet, giving the common and scientific names of the trees and the State or country contributing them, besides other valuable information concerning the resources of the locality. Above the cornice of the veranda, on all four sides of the building, are flagstaffs, which will bear the colors or coats of arms of the nations or States represented in the interior exhibits.

The interior exhibits will be in several main groups. Natural woods will be shown exclusively by States, Territories and foreign countries. The product of the various woods, finished or partially finished, will be shown by individual exhibitors or firms. The methods and processes of manipulating timber at every stage, from the tree trunk to the finished product, will be shown by firms or corporations. The completely finished product will not be shown in this building, as it belongs to the department of manufactures; neither will there be any machinery in motion in the Forestry Building. It will be a still exhibit, but the various ways of denuding forests for economic and commercial purposes will be shown by models, maps, drawings and other methods.

The foreign countries which have obtained space inside the Forestry Building are Japan, Honduras, Peru, Hayti, Spain, Germany, Ecuador, Colombia, Brazil, Mexico, New South Wales, Canada, Russia, Italy, France, Siam and India. Each of these countries has a separate space, and will make a showing of its most characteristic woods. Miniature structures will be built, with arches and railings of natural wood and in rustic design. Canada has the largest space of any foreign government, and the various provinces of the Dominion have promised to make an interesting showing of their timber resources.

The States and Territories which will have interior exhibits are: Pennsylvania, Louisiana, Virginia, Arizona, Kentucky, Minnesota, Nebraska, Montana, Wyoming, New Mexico, Wisconsin, North Dakota, Ohio, Washington, Michigan, West Virginia, Missouri, North Carolina, Indiana, Maine, New York, California, Utah and Idaho. Of these West Virginia and Michigan have the largest space, and the exhibits from these States will be on an elaborate scale. Other States will show peculiarly unique specimens, and the grouping of woods in the various spaces will form a most artistic whole. Sections of tree trunks will be built one on top of the other, and each portion of the exhibit will be accompanied by detailed information as to the locality producing the exhibit, the area still under growth and where located, and all other pertinent information.

It is one of the rules of the forestry department that there shall be no finished wood products in the building, and where it is necessary to show the special uses of certain kinds of woods it will be shown by pieces of disjointed furniture or other partially finished product.

The foreign exhibits will include all the remarkable woods and wood products that are familiar in name only to Americans. The India exhibit will include sandal woods and a precious Government collection of unique and valuable woods. Brazil will show the various grades of mahogany, California the red wood and giantica, Canada the various pines, birch and maple and a host of other trees of commercial value.

Some of the State exhibits will be peculiarly interesting. Nebraska will show the results of tree planting and the special results of the observance of Arbor Day in that State. This exhibit will contain specimens of actual woods, with tabulated information showing the age of each specimen, how and when planted. North Dakota will make a similar exhibit. Some of the exhibits will be genuine surprises. For instance, Kentucky, which is not popularly considered a forest State, will show as elaborate an exhibit as most of its neighbors. From Kentucky there will be specimens of white oak, 4 or 5 feet in diameter, built in the form of a pyramid. Kentucky will also show a very fine relief map, pointing out the principal forests in the State, with full statistical information regarding them. Ohio, Wisconsin and North Carolina will make exhibits of medicinal plants and herbs gathered in those States. Ohio alone will show varieties of medicinal herbs amounting to 400 or 500. This is a new feature in American exhibits.

One of the remarkable foreign exhibits will be from Paraguay, which will show 321 varieties of woods, each 1 meter high and from 12 inches to 4 feet in diameter. In this exhibit will be beautiful specimens of barks, dyewoods and other commercial products of that portion of South America. The Argentine Republic will have an exhibit of remarkable woods. France and Germany will have the best scientific exhibits, giving illustrations of constructive forestry from the results of wide experience. Japan will make a most creditable showing, and the various wood specimens from the flowery kingdom will be the first ever shown outside of that country.

Among the spectacular exhibits will be an immense trophy in the center of the building. This will consist of a collection of large natural timbers from various States. North Carolina will send a large walnut log, Kentucky will send a mammoth white oak, Kansas will send a walnut log 7 feet in diameter and weighing 30,000 pounds. There will be immense tree trunks from the State of Washington. Another spectacular exhibit will be a long spar of ship timber from Washington.

The individual commercial exhibits will include specimens of wood pulp, cork, parts of furniture and wooden ware. The pulp industry, which is rapidly growing in importance, will be represented by several exhibitors from foreign countries. The World's Fair exhibit will contain the most complete display of the utilization of wood products that has ever been brought together.

Outside the Forestry Building, but connected with the department, there will be shown a typical logging camp. This is contributed by Michigan, and will be located at the south end of the park.

Logging methods will be shown, including snowsaws loaded with logs, saws, axes, chains, skids, rollers and old implements used in the early days by the lumbering industry. There will also be a typical logging hut, showing how lumbermen

live in the back woods. In another part of the grounds, near Machinery Hall, will be shown an actual sawmill in full operation. The process of converting logs into various kinds of lumber will be gone through on a realistic scale.

To practical builders from other countries the Forestry Building itself will convey many suggestions as the American methods of house raising. There was not a single nail used in the construction work. The method of construction followed by Mr. Atwood, the designer, is intended to show peculiarly American methods of joining timbers so as to economize materials. Wooden pins were used instead of nails.

#### An Official Change.

After having served the exposition as mechanical and electrical engineer for 18 months, Frederick Sargent last week tendered his resignation to Director of Works Burnham, and it was promptly accepted. The Council of Administration lost no time in approving Mr. Burnham's action.

Mr. Sargent's resignation hardly caused a ripple of surprise among the exposition officials, although it came unannounced. It has been known for several months that affairs in the department of electrical and mechanical engineering were dragging. Mr. Sargent, when questioned by the council concerning the progress of the work in his department, returned answers that were most unsatisfactory. Finally he was asked whether the electrical and mechanical engineering would be completed by May 1. He replied that it would not. Then Mr. Burnham interrupted with the assertion that the engineer was mistaken, and that the work would be completed. Shortly after that meeting the affairs of the department were reorganized. R. H. Pierce was given charge of the electrical division, and Charles F. Foster the mechanical department.

This having been accomplished and everything made ready for renewed action, the resignation referred to was next in order.

#### Silver Statue to be Cast Soon.

Commissioners W. M. Bickford and Dr. A. H. Mitchell of Montana are in Chicago to superintend the casting of the silver statue for the World's Fair, and within the next ten days the image of Ada Rehan will be taken from the molds of the American Bronze Company and presented to the gaze of the public. The National Smelting & Refining Company have 11,994 ounces of the silver and an additional 12,000 ounces was delivered to the commissioners last week by the Adams Express Company from the Omaha smelters. The white metal is from the Moulton, Curlew, Elizabeth and Wickes Mines, all of them noted silver producers, and the World's Fair Board is under bonds for its safe return to its owners. Invitations will be issued by the American Bronze Company to a public pouring, and the casting will be conducted with due ceremony. The heads of the departments of the exposition will be in attendance and Chief Skiff will pour the metal into the mold. Several Montanians will be present at the ceremony.

#### Fete Days at the Exposition.

The following is a complete list of special fete days as arranged up to date by the Committee on Ceremonies:

Washington	May 17
Wisconsin	May 23
Maine	May 24
Denmark	June 5
Germany	June 15
Nebraska	June 15
Massachusetts	June 17
New Hampshire	June 21
France	July 14
Utah	July 24
Liberia	July 26

Commercial travelers	July 26
Independant Order of Foresters	Aug. 12
Hayti	Aug. 16
Colored people	Aug. 25
North Carolina	Aug. 18
Austria	Aug. 18
The Netherlands	Aug. 31
Nicaragua	Sept. 1
New York	Sept. 4
Brazil	Sept. 7
California	Sept. 9
Maryland	Sept. 12
Michigan	Aug. 13 and 14
Kansas	Aug. 15
Colorado	Sept. 19
Montana	Sept. 20
Patriotic Order Sons of America	Sept. 20
Iowa	Sept. 21
Rhode Island	Oct. 5
Spain	Oct. 12
Italian societies	Oct. 12
Minnesota	Oct. 13

#### Arrival of a Large Cannon.

One of the biggest guns belonging to the United States Government was shipped into Jackson Park last week for installation in the Government Building. It is not the biggest gun in this country because there are two or three others of equal size, but none larger. It is 36½ feet long and weighs 58 tons. It is a 12-inch breech-loading steel rifle and will carry a projectile weighing 1000 pounds. A charge of 460 pounds of powder is burned every time the lanyard is pulled. A specially constructed twin car was required to carry the gun. Each car used was 70 feet long and built of steel. The cannon rested on a truss, or bridge, the center of which was over the couplings of the cars. Great care was manifest in the making of the little train. Each car was provided with 12 wheels of steel, and on each was a brake to secure the instant stopping of the train in the event of that being necessary. On arrival at the Government Building three big gun lifts were placed over the car and three immense chains wound about the cannon and by means of hydraulic jacks the gun was lifted slowly upward and the special cars pulled from beneath it. The cars were returned to the East, and will be used to carry the Krupp cannon, which is expected shortly. The Krupp gun will be almost twice as large as Uncle Sam's specimen cannon. It will weigh 128 tons and have a bore 25 inches in diameter.

The cannon which reached the park last week came from the United States arsenal at Watervliet, N. Y. It has never been tested. There is a companion gun of its size at Sandy Hook, N. Y., and several shots have been fired from it. It will throw a projectile at least ten miles.

#### British Exhibits.

Pitt & Scott, foreign carriers, have shipped from London several hundred tons of exhibits for the fair. The exhibits are of a most varied description and include a number of models of steamships, among which is the model of the famous Confederate cruiser Alabama. This model is sent by the builders, Laird Bros. of Birkenhead. Another package measuring nearly 50 cubic tons was shipped last Friday and contains a large model of Her Majesty's steamship Victoria, which was exhibited at the naval exhibition in London. This model is forwarded by Armstrong & Co. of Newcastle-on-Tyne.

There arrived at this port last week, for exhibition at Chicago, a locomotive engine, named "Queen Empress," of the Webb compound type, weighing, fully equipped with tender and fuel, about 80 tons, and capable of making 90 odd miles an hour with an ordinary passenger train on its own railway. It is of the latest and highest product of the works of the London & Northwestern Company at Crewe, England, and is one of the largest and heaviest engines used in Great Britain. Its four driving wheels measure 7 feet and 6 inches in diameter.

#### Ingot Molds.\*

BY MR. JAMES RILEY.

In 1875, at the Manchester meeting of the Iron and Steel Institute of Great Britain, a paper on ingot molds was read by Mr. Hackney, in which he endeavored to point out the best form for a mold, having in view the desirability of it standing as many casts as possible before failure through splitting. The author also illustrated the different types of mold which had been tried in practice up to that time, and stated the causes of failure in various instances. Briefly, it may be mentioned that he argued in favor of the type of mold which has been most commonly used from that time to the present. This type is so well known as scarcely to need description—it is "cast in one piece in the form of a frustrum of an elongated hollow pyramid open at both ends, and slightly smaller at the top than at the bottom." It came out in the course of discussion that this type of mold was introduced, like many other appliances now in common use in the steel trade, by Sir Henry Bessemer in the course of his early struggles to make his process a practical success.

Although in its latter form this mold has done admirable service, I have for a long time thought that serious disadvantages attended its use. I may be permitted to recall to your minds that the operations involved in dealing with ingots in the casting pit are as follows: stripping the mold from the ingot, removing the ingot from the pit, and replacing the mold ready for the next cast. Here are three distinct operations requiring a considerable use of crane power and manual labor, occupying time which is of much importance in the working of a hardy driven casting pit, and resulting in an addition to cost which might well be spared. Now, it will be at once apparent that if the mold could be used in an inverted position in the pit, so that the ingot could at once be lifted out of it, the mold would be left in position ready for the next cast, and a large proportion of the time, labor and crane power would be saved. But a more important consideration is this. It is common knowledge that the upper end of an ingot is always more or less unsound, honeycombed and piped, as we commonly term it. The injurious effects of this unsoundness are more or less corrected by consolidation under the hammer or in the cogging mill, and by cutting off the worst portion as scrap. But you will at once perceive that in the process of consolidation the form of the ingot renders it unavoidable that considerably more work shall be put upon the part where it is least necessary, while on that portion where it is most essential that work shall be applied much less is done than in some cases—nay, in most cases—desirable. That is to say, the large bottom end of the ingot, which is sound, is well worked, while the small upper end, which is quite unsound, has less consolidation and work than is absolutely necessary.

I am not aware that the points to which I have referred have ever been alluded to in any paper or discussion, but I think it probable that they have long ere this received some consideration; in fact, they are so palpably evident after a little reflection, that they must often have received some attention. In the course of the discussion on Hackney's paper, above referred to, Mr. Snelus said: "At Givors he found them using a solid-topped mold inverted—that is, the smaller end was down at the bottom, and the metal was run into the larger end of the mold; then they turned

\* Paper read before the West of Scotland Iron and Steel Institute, February 17, 1893.

the mold over and threw the ingot out. He saw a few of those stick, and was not sure how long the molds would last." No mention was made of the reasons which led to this use of the inverted mold or the advantages obtained in its use. About that time, or a little later, at the instance of the late Sir William Siemens, I had the mold made to be used in the inverted position. It was provided with trunnions on two sides about the middle of its length, on which it was to be supported on standard bearings, the intention being that it should be readily overturned, so that the ingot should drop out, and that thus, say, two-thirds of the crane power—the charge for which was a serious item—should be dispensed with. I forget the reason for abandoning the idea, but no doubt it would be found anything but a handy form of mold, and the discomfort and trouble to the pitmen in turning over the mold and putting on the grips, or dogs, in pits closely crowded together, filled with hot molds and ingots, and placed between two rows of melting furnaces, as was the case at Landore, would be a somewhat serious matter. Anyhow, the mold was used but a few times, and, although thoughts of such a mold had recurred more than once and had also been suggested by others, it was not until a couple of years ago that the idea occurred to me of the mold that is shown in the diagrams.

Its origin was due to a proposal of Mr. Dick, then manager at Newton, that pieces of steel bent in the form of large loops or staples should be suspended across the center of an inverted mold, and sufficiently low in the mold for the steel to rise up about their lower extremities, which would thus become fixed in the ingot as it solidified in cooling. The crane hooks were then to be placed in these loops and the ingot lifted out of the mold. As a matter of fact, many ingots were so dealt with, but unfortunately we could not afford the time needed for the ingots to become sufficiently cool to insure the secure fixing of the loops, and many of them dragged out when the attempt was made to lift the ingot. The desirability, not to say necessity, of success had, however, assumed such importance that my mind kept reverting to it, with the result that I devised the method I now submit to you. Of course, the difficulty was how to get the ingot out of the mold, and that was overcome by casting the mold with openings to admit the dogs, these openings being filled with the key or wedge pieces during the process of casting. The form of these key pieces is such that they form an easy fit in the apertures and yet are readily removed after the metal has solidified. The mold stands on a bottom, whose upper surface is curved in the direction of its length, and the bottom end of the ingot is of course similarly shaped, but with an inverted curve. The object of this is to insure that the slab produced in the cogging mill shall be square at the end, by reason of the greater elongation of the thicker middle portions of the ingot. I have only to add that, although some initial difficulties were met with, they were gradually overcome, and by Mr. Duff's careful attention to the modification of details in the design of the molds they are now thoroughly satisfactory and have quite fulfilled all I anticipated from their use.

The Detroit Foundry Equipment Company have established a Foundrymen's Exchange at 225 Dearborn street, Chicago, with a view to diffusing knowledge of the industry, through printed matter, and to bring into closer touch those engaged in the foundry business generally. It is suggested that this step may possibly lead to the formation of a permanent foundrymen's association such as exists at Phila-

delphia, and which has proved so popular and from which so much good has resulted. Newspapers, journals and reading matter of a popular and technical nature are on file in the club room, which is open free to those interested for study and social intercourse.

### The Schneider Gun Mount.

From the Annual of the office of Naval Intelligence, United States Navy, we take the following description of the hydraulic-

carriage lifting from the slide. The slide B is bolted to the transom C, and carries lugs, V, to which are bolted the recoil pistons, and the spring buffers G to take up shock of running in or out. The elevating gear is bolted to the side, and, therefore, does not recoil with the gun. The upper faces of the slides are inclined at an angle of 8°. The transom C, turning on the pivot, revolves on the free conical rollers H, which are retained in place by inner and outer rings; bolted to it are the clip hooks I, taking under the rim K of the bed plate to prevent the carriage lift-

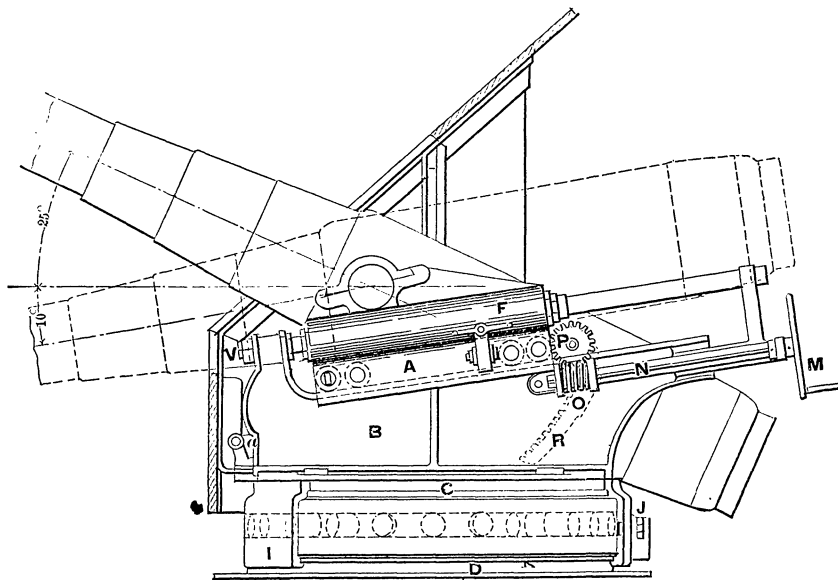


Fig. 1.—Side Elevation.

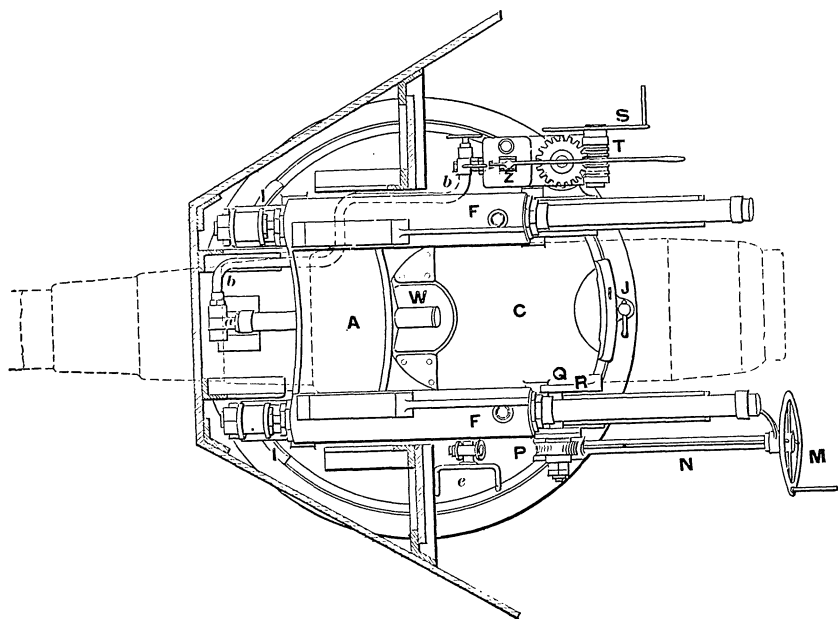


Fig. 2.—Plan.

### THE SCHNEIDER GUN MOUNT.

recoil gravity-return mounts constructed by Schneider for the 14 cm. Spanish Hontoria guns, on plans furnished by General Guillen:

"The following description of the carriage will be understood by reference to the accompanying drawings: The gun rests in trunnions on the upper carriage, A, which carries the recoil cylinders F, and rests on roller E on the slide B; these rollers E are retained in position by cheeks of the upper carriage, the outer ones of which are flanged to act as clips to prevent the

ing, and on the rear clip is the lug J for the securing bolt. The bed plate D, bolted to the deck, forms the pivot, and carries on its circumference the cogged rack L, in which gears the cogged wheel of the training. A housing socket is cut in the bed plate for the securing bolt J.

The mount admits of 25° elevation and 10° depression. The gear consists of the wheel M, arm N, endless screw O, and cogged wheel P, set with friction control, actuating the quadrant rack R on the left side of the gun. To raise the muzzle from

extreme depression to extreme elevation requires seven seconds of time.

By means of the worm T, actuating a cog and vertical axle, the wheel S, on the right side of the gun, revolves a cog wheel geared to the rack L of the bed plate, and so turns the mount. One man can train the gun through 360° in 54 seconds.

On the under side of the upper carriage A is the small cylinder W, in which is the hollow piston a, secured to the front of the slide B. The pipe b connects it with the pump Z, fitted to the right side of the carriage, and shown in detail in Figs. 4

forced through a narrower channel, v, Fig. 4, the flow being controlled by the screw stem d, thus reducing the velocity of the return.

Pivoted to the upper carriage is a clamp, operated by the handle e, which takes against the upper edge of the slide and secures the gun for sea.

The carriage is protected by a 1.18-inch steel shield mounted on it, weighing 1.8 tons. The weight of the mount without the shield is 3 tons.

In the Circuit Court at Canton, Ohio, last week, an adverse decision in a famous

trial in Common Pleas Court resulted in favor of Morgan's estate, and the Circuit Court last week confirmed the decision, to which exceptions were taken. The amount involved approximates \$60,000.

**A Chilean Iron Enterprise.**—The *Diario Oficial* states that the Government of Chili has issued a decree to C. E. Lister, granting to him some valuable concessions, under which he will organize a company and establish a plant for the manufacture of iron products—bars, plates, rods, angles, &c.—which will also embrace a department for galvanizing and corrugating sheet iron, and a plant for turning out shovels, hammers, bolts, nuts, rivets, cut and wire nails, horse-shoes, wire, and a large variety of other hardware and agricultural products. Of the concessions granted by the Government, the principal one is the free gift of all the scrap iron and steel, which up to the present time has had no value in that country, for a period of three years. The present supply is estimated to be between 3000 and 4000 tons per annum, and at the expiration of three years the waste material belonging to the Government will be delivered to the proposed works for a further period of 15 years at the rate of \$1.87 per ton. The Government grants to Mr. Lister land in the bay of Talcahuano for the use of the enterprise, also freedom from custom house duties to the amount of \$150,000 on material for the use of the works. The entire grant of the Government is estimated to be worth half a million dollars. When fully established the works will be in a position to do all the repairs necessary to Chilean and foreign war ships and the mercantile marine. The enterprise is regarded with

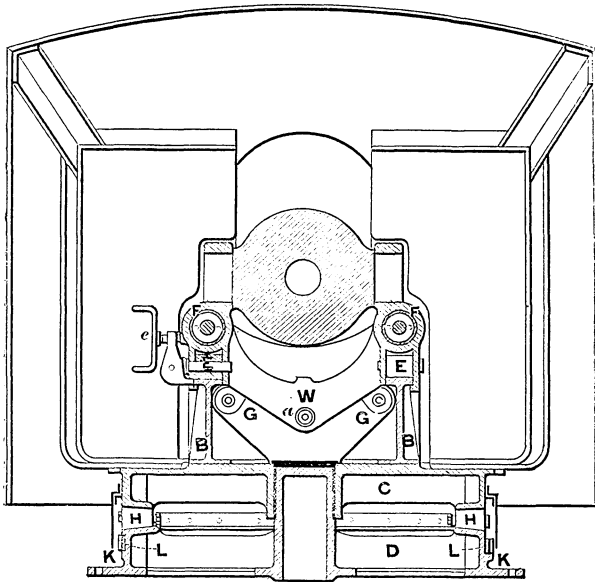


Fig. 3.—Vertical Section.

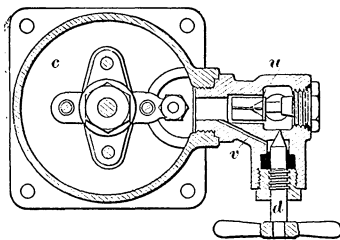


Fig. 4.—Horizontal Section on Lines r s, t u of Fig. 5.

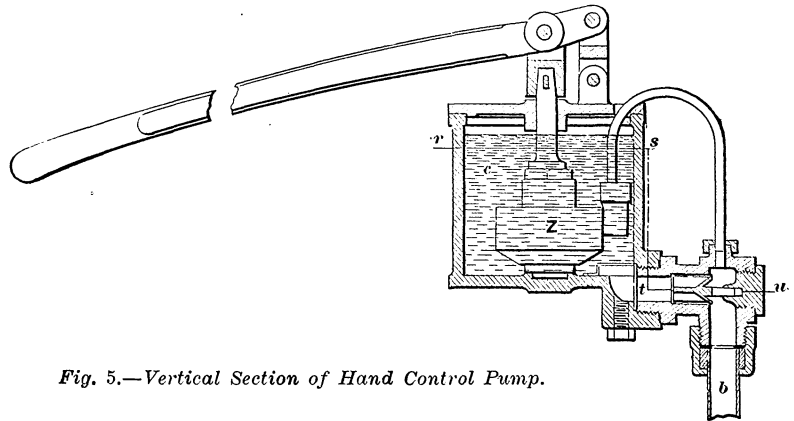


Fig. 5.—Vertical Section of Hand Control Pump.

#### THE SCHNEIDER GUN MOUNT.

and 5. The pump is in a box and is completely surrounded by the liquid, the system serving two purposes. 1. When it is desired to run the gun in by hand, by working the pump the liquid is forced through the small curved pipe and the pipe b, enters the cylinder W through the hollow piston a, and forces the upper carriage and gun to run in. To retain the gun run in by hydraulic power, the stem d, Fig. 4, is screwed into its seat, and by thus preventing the backward flow of the liquid, keeps the cylinder W full and the gun stationary. 2. The other use of the system is to control the gravity return of the gun to action, as follows: The check valve u opens or closes communication between the pipe b and the reservoir c. When the gun recoils, a vacuum being produced in the cylinder W, the valve u lifts, and the liquid flows from the reservoir c into the cylinder W. When the gun returns to battery, the pressure closes the check valve u, and the liquid is

case was rendered. The suit in question was that of the creditors against the original stockholders of the Alliance Rolling Mill Company, Alliance, Ohio, who became involved about 20 years ago. The creditors sought to hold David Morgan, a wealthy citizen of Cleveland, a former stockholder in the company, liable for their indebtedness on the ground that when he surrendered his stock to the company for cancellation two years prior to his failure it was not authorized by a majority vote of the stockholders, as required by law, and a notice filed with the Secretary of State. The suit was first given to a referee, who decided in favor of the creditors, and his decision was confirmed by the Common Pleas and Circuit Courts. The Supreme Court then reversed these findings and remanded the case to the Common Pleas, because of the exclusion of evidence offered before the referee. In the meantime Morgan died and his executors have since represented the estate. The second

considerable favor by the people of that country.

A lamentable sequel must be recorded to the novel feat in engineering narrated last week, when 30-ton steel roof trusses were stated to have been hoisted 160 feet into position by a great derrick at the Mackaye Spectatorium on the World's Fair grounds. The work of hoisting was proceeding on the 7th inst., when a casting on the derrick broke under a load of only 10 tons. The boom fell, killing one man and perhaps fatally wounding two others. The building is owned by the Columbian Celebration Company and the contractors are William Mayor & Co. Mr. Mayor says that he has taken every precaution for the protection of life, and that this is the first serious accident that has occurred, although there are more than 1500 men working on the spectatorium. The derrick has been tested to a capacity of 50,000 pounds.



### The Cunard Steamship "Campania."

There is now nearing completion the first of two magnificent vessels built by the Fairfield Company for the Cunard Line. These vessels are larger than any now afloat in general dimensions, displacement and horse power, and are confidently expected to develop the greatest speed. The "Campania" measures 600 feet between perpendiculars, and 65.7 feet beam, being only 80 feet less in length than the "Great Eastern" and 17 feet less in width. The next largest vessel is the "Teutonic," which is 34 feet less in length and 8 feet narrower. The gross tonnage of the "Campania" is about 12,000, and her displacement will probably be 18,000 tons. She is fitted, says the *Engineer*, from which we take the following, with two sets of the most powerful triple-expansion engines that have yet been built. Each set is capable, it is estimated, of indicating from 14,000 to 15,000 horse-power. Each set of engines has five inverted cylinders, as follows: Two high-pressure, one intermediate and two low pressure cylinders. The two low pressure cylinders are placed tandem-wise above the high-pressure cylinders. They are arranged to work on three cranks, set at angle of 120° with each other. Each of the high-pressure cylinders is fitted with a separate piston valve, and the intermediate and low-pressure cylinders are fitted with double piston valves, all of which are worked by the usual double eccentrics and link-motion valve gear. Steam from the two high-pressure cylinders exhausts into the intermediate one, which in turn exhausts into the two low-pressure cylinders, which have relieved slide valves. Expansion takes place in three stages.

The reversing engines are of the steam and hydraulic direct-acting type, and fitted with patent automatic emergency gear calculated to prevent such a disastrous breakdown of the engines as took place on board the "Paris." The crank shafts are all of the built type, in interchangeable sections. Together with the tunnel and propeller shafting, they are of mild steel, forged by Vickers' Sons & Co., Sheffield. The condensing water is circulated through the condensers by four large centrifugal pumps, each driven by independent compound engines. These pumps may also, if required, pump water from the ship in case of damage to the hull. In the engine room are also fitted four evaporators to produce the necessary fresh water from sea water, and thereby make up the loss incurred through working, and avoid the use of salt water in the boilers. There is also a large feed-water heater, two auxiliary condensers with pumps and all the most modern appliances to economize fuel and labor.

Steam for the main engine is generated in 12 large double-ended boilers, each having eight corrugated furnaces. The boilers are arranged in two groups of six, each group self contained in water-tight compartments, and having a common funnel of the unprecedented diameter of 21 feet. The two funnels, it may be added, are from their lowest section 120 feet high, or about the height of the Eddystone Lighthouse. There is also a large single-ended boiler for supplying steam for the electric light, refrigerating and other auxiliary machinery. In addition, a small single-ended boiler is fitted on the lower deck for supplying steam to the distilling condensers, heating pipes, &c. An elaborate system of piping is fitted throughout the ship and connected to the various auxiliary pumps for filling and emptying the ballast tanks, pumping out bilges, pumping water on deck in case of fire and other purposes.

Her gigantic proportions considered, it will be readily understood that the greatest

care and forethought have been expended on the structural arrangements, and details throughout the huge vessel. Not only has the requisite continuity of strength been maintained throughout the entire length, in ways which experience has firmly established, but structural features have been introduced which may be said to be uncommon, if not entirely new, in ship-building practice; suggested, if not necessitated, by the conditions as to size and proportions. All scantlings have been especially arranged, and every advantage taken of the improved sections of steel now obtainable in the way of channel bars and Z-bars, &c., in order to increase the strength without adding unduly to the vessel's weight. The shell plating is in lengths of 26 feet, and in some cases longer. From the keel, which is of the flat-plate type, upward to about the load water-line, the plates are fitted on the lap-butt principle, which within recent years has been steadily taking the place of flush end-to-end butt-strapped joints in merchant ships, especially those intended for carrying oil in bulk. The *raison d'être* of this change doubtless lay originally in the saving of weight and of riveting thereby effected, but experience has shown that the overlapped joint, though less slightly than the flush butt, is stronger and more efficient. In the case of the "Campania" the method adopted is somewhat more elaborate and expensive than in ordinary practice, and follows closely upon the example set by Messrs. Harland & Wolff of Belfast in their large ships. By the method in question the shell plates are scarfed—thinned and tapered away at the ends—for the width of the seam, thus dispensing with the tapered packing pieces in the seams at the overlap. This forms a much fairer, easier made water-tight and more slightly seam, and presents a surface to the water offering less frictional resistance. The lapped butts are all quadruple riveted. Above the water line the plates are fitted end to end in the usual way, and butt strapped both inside and out. The landing edges of the shell plating in the region of the sheer strakes and at the bilges are treble riveted.

The construction of the vessel at the stern impresses one as being uncommon in other respects than that merely of immense size. Although fitted with twin screws, there is an aperture in the stern frame similar to that in a single-screw steamer. This is provided that the propellers may work freely, though they are fitted close to the center line of the ship in order to prevent damage to or from the quay walls. No struts are fitted at the stern frame to support the outer end of the shafts, as in most other twin-screw steamers. These are in the present case dispensed with, and the frames of the hull are bossed out and plated over right aft, so as to form the stern tubes. At the outer end of these, strong castings of steel weighing about 20 tons are fitted, extending completely across and through the structure. These serve the purpose of shaft brackets, and, being in continuation of the lines of the hull, are calculated to offer the least resistance to free propulsion. What in other vessels forms the upper part of the rudder is a fixed and symmetrical part of the hull structure, the rudder proper being entirely under water. It is of the single plate type, being formed of a heavy steel casting with massive arms, between which a thick plate is fitted and riveted. This plate, which has earned some notoriety as being made in Germany, is in one piece and weighs about 10 tons, the whole rudder weighing about 24 tons. The cast frame work of the rudder, as indeed all the heavy castings entering into the ship's structure, were supplied by the Steel Company of Scotland. Chief of these are the stern posts of the form adopted—unusual in the case of twin-

screw ships. Each complete stern post weighs about 90 tons, and consists of four pieces which are riveted together; in position the main post reaches a height of about 50 feet.

The bottom of the vessel is constructed on the cellular principle for water ballast, minute water-tight subdivision being a feature in the arrangement. There are four complete tiers of beams, all of which are plated over with steel and sheathed with wood planks, forming the upper, main, lower and orlop decks. The last is used for cargo and refrigerating chambers, storerooms, &c. The other decks are entirely devoted to the accommodation of passengers, with dining and social saloons, staterooms, bathrooms, lavatories, &c., all on a scale of magnificence unequalled. No expense is being spared on anything calculated to render traveling at sea more comfortable and enjoyable. The casings around the boiler rooms are double, the intervening space being filled with a material which is at once a non-conductor of heat and sound. The ventilation throughout, both by natural and artificial means, is very thorough. The greater number of the side lights are fitted with an arrangement for the free admission of air, even when, during rough weather, the lights are closed. A complete system of steam heating is fitted for the comfortable warming of all the living spaces.

The electric installation on board is in keeping with the other marvelous details of the huge vessel. There are four sets of generating plant on board, each set consisting of a Siemens dynamo, coupled direct to a Belliss engine, which runs at the rate of 280 revolutions a minute, and gives an output of 42,000 watts. This is capable of supplying 1350 16 candle power incandescent lights—including eight large reflectors of eight lights each for working cargo—throughout the ship, and, in addition, a powerful search light for facilitating the navigation of the ship into port, the picking up of moorings and scouting in time of war. The large switch board for controlling the lights consists of 13 sections, so arranged that each may be connected with any of the four dynamos. From these dynamos and this large switch board there runs throughout the ship an enormous amount of wiring—reaching, in point of fact, to upward of 40 miles in length.

Action decidedly hostile to the Chicago skyscraper idea was taken at the Council meeting in that city on the 8th inst., when an amendment to the building ordinance was passed, limiting the height of structures to 130 feet, or ten stories. This is considerably lower than builders had supposed the limit would be placed, but the sentiment against tall buildings has latterly been growing very rapidly.

Judge Pennypacker, in Philadelphia last Friday, made an order authorizing the receivers of the Reading Rolling Mills Company from time to time to borrow money for paying wages, salaries and freight, or for materials or supplies furnished the receivers. The amount of the loans outstanding at any time are not to exceed \$100,000.

Captain McDougall announces that the whaleback steamer "Charles L. Colby" and barge 110, which were built at West Superior and sent to the Atlantic coast some time ago, will be brought back to the lakes upon the opening of navigation. Indications of a dull season on the coast and prosperous business on the lakes are causes given for their return.



**Thermal Storage for Central Stations.\***

BY GEORGE FORBES.

When asked to give you a paper on some electric lighting subject, it seemed to me that I could not choose a better one than "Thermal Storage for Central Stations," which has had so much attention directed to it lately in England. It has long been evident that storage of some kind might lead to great economy in central station work. The reason of this is that the demand for light has, in most cities, a maximum for only two or three hours of the day. Not only do we require to have plant lying idle all the rest of the day, but the expense of working for those few hours is increased by its temporary character. This loss of economy has occurred both in engines and boilers. Underloaded engines are very inefficient and use up a lot of coal. The defect is, however, got over in all important central stations by having at least a few engines of small power to carry the day load. We are thus able to have engines in use always working at their most economical load; that is, near full load. The other loss in economy comes from the boilers, which have to be fired up and heated only for a few hours' work, and then banked or else allowed to cool down. This loss cannot be overcome by working the ordinary plant in any special manner. At the Kensington station in London, where the engines are always working at an economical load, 5 pounds of coal are used per electrical horse-power per hour, whereas in tests of 24 hours' duration, made on the same plant, with all the boilers doing full work, only  $3\frac{1}{2}$  pounds of coal were required for the same duty. If, then, we could have storage of any kind by which power is absorbed at times of light load and given off at times of heavy load, we should save  $1\frac{1}{2}$  pounds of coal per horse-power per hour.

Many people have thought that storage batteries would overcome this trouble. It does so; but at an enormous capital expenditure in storage batteries, with a loss of 20 per cent. in the energy given to the batteries, and with a depreciation account which no one would put at a less figure than 12 per cent. per annum.

I have previously proposed that in a hilly country the boilers and engines should be working all the 24 hours, at the rate of the average demand, and that they should be used to pump water through a pipe to a high reservoir at least 500 feet above the pumping station. At the lower end of the pipe turbines are placed driving dynamos. During the daytime the reservoir is being filled, and in the evening it is being emptied. This produces a saving in boilers and the substitution of cheap turbines and a small number of efficient pumping engines for a large number of less efficient engines to drive dynamos. It also reduces the coal consumption from 5 pounds to 3 pounds per horse-power per hour. In a paper read last year before the British Association for the Advancement of Science, I showed that this plan could easily be adopted at Edinburgh. In Scotland, the saving in capital and annual expenses being both very large.

But it is not every city that has these advantages, and I wish now to introduce to your notice the excellent scheme which has been invented by Dr. Halpin of England.

He proposes to put up boilers only of the average capacity and to work them day and night. At times of light load the steam is carried through pipes into large iron reservoirs of cheap construction, and is used to heat up the water in these res-

ervoirs to a high temperature and pressure. When the heavy demand comes on in the evening, steam is drawn from these reservoirs. The losses of heat from radiation from the reservoirs can be made very small indeed; with proper lagging, in fact, quite imperceptible.

This is the general scheme of Mr. Halpin's plan. But it has two advantages which are not so apparent at first sight. One is the purity of water supplied to the boilers. Mr. Halpin's pumps feed water into the hot reservoirs, where impurities are precipitated in a place where they can do no harm. The boilers, on the other hand, are fed from this pure water in the reservoirs.

The other incidental advantage of the system is that priming in the boiler does not cause any inconvenience, as the steam is all supplied to the engines from the reservoirs. Now, it has been found from the experience with the water-tube boilers, which are so much used in this country, that only 3 pounds of coal per hour can be burned per square foot of heating surface, on account of excessive priming, instead of the 6 pounds per square foot which we can use with the Cornish or Lancashire boilers, and which might be used with water-tube boilers if priming were no objection. Thus it appears that the adoption of Mr. Halpin's system not only reduces the number of boilers that we require, but also doubles the capacity of each boiler.

Mr. Halpin has worked out the relative cost of supplying machinery to the central stations of Berlin: 1, without any storage; 2, with storage batteries, and 3, with thermal storage. He first selected this station, because the output at each hour of the day all through the year was published before any other central station had published similar data. In this system there are four central stations, giving off about 10,000 electrical horse-power.

The load at different times of the day is such as to lead to the following data:

Maximum load .....	7,500 kilowatts.
Mean load .....	2,030 kilowatts.
Excess of maximum above mean .....	3,080 kilowatts.
Duration .....	7.5 hours.

Now, Mr. Halpin claims that he can replace 22 boilers for working in the ordinary way by five boilers and 92 of his storage cylinders, which are cheap to construct, and have, necessarily, a small depreciation. His claims, which, I must admit, seem to be quite well founded, are that while laying out somewhat more capital on his plan, he gets a very large return from the extra capital spent. He sums up the cost of the thermal storage system as follows:

5 Babcock & Wilcox boilers .....	\$27,050
Boiler house .....	9,500
Chimney .....	4,850
Cylinder house .....	33,300
92 cylinders .....	184,000
Total .....	\$258,700

and he puts the cost under the existing system at \$182,700.

Now, if we charge 10 per cent. to annual depreciation of boilers and only 5 per cent. on the iron cylinders, which really seems a very fair value, then the annual interest and depreciation comes out almost the same for both systems, thus:

*Existing System.*

5 per cent. on \$182,700 capital .....	\$9,135
10 per cent. on \$117,850 boilers .....	11,785
4 per cent. on \$64,850 buildings .....	2,600
	\$23,520

*Thermal Storage.*

5 per cent. on \$258,700 capital .....	\$12,935
10 per cent. on \$27,050 boilers .....	2,705
4 per cent. on \$47,050 buildings .....	1,900
5 per cent. on \$18,400 cylinders .....	9,200
	\$26,740

Annual charges against thermal storage,

\$3220; but the annual saving in coal is, in this special case, 7000 tons, besides the saving in ash removals and firing. Mr. Halpin thus obtains figures giving an annual saving of \$36,530 to pay interest on extra capital of \$75,000, with coal about \$5 per ton.

Now, the only kind of storage against which Mr. Halpin has to compete, when high land is not available, for utilizing water storage, is the storage battery; and from his figures, which seem fair to me, the extra capital required is \$732,200, and the total annual extra cost is \$110,570, which shows a great advantage in favor of thermal storage.

I consider that all these figures are very conservative, and that in these days, when we are learning to realize the importance of cutting down working expenses in central stations, this system must necessarily occupy an important place. But it is of peculiar interest to me, owing to its applicability to a kind of work to which I have devoted a large part of my time in the last seven or eight years. I refer to the burning of the house refuse and garbage in our cities. The furnaces in which this cremation is accomplished are generally called "Destructors." It has been one of the great objects before me of late years to have this title abolished, and to justify their being called "Utilizers." The improvements which we have introduced in the methods of burning refuse are so great that I can now undertake to produce the following results:

Taking the ordinary house refuse, consisting of ashes, coal, wood, paper, old boots, vegetables, bones and scraps, crockery, tin cans, iron pots, bottles, and adding thereto occasionally dead cats and dogs, infected mattresses and condemned meat, I can throw the whole of these, without sorting, upon the furnaces, and without producing any offensive odors or dust, I can raise the temperature of the gases where they reach the boilers to over 200° F. From my data as to the amount collected in different houses in England per head of the population, I find that from the house refuse of any town I can supply enough steam to generate electric light at the rate of one 16 candle-power lamp per head of the population for two hours every night of the year. By doing this, I am saving the municipality from \$10,000 to \$30,000 per annum per 100,000 inhabitants for the cost of removal of house refuse. I am preventing these objectionable materials from being dumped in the outskirts of the city, where building operations will soon commence, or in the neighboring harbors or lakes, either of which plan is a nuisance and unhealthy. The only resulting material is a clinker, which can be broken up and which, when mixed with cement, makes admirable concrete or artificial stone for paving, while by itself it makes excellent foundations for roads.

Now, these enormous advantages, of the truth of which we have ample proof from a practice extending over nearly 20 years in England, can be worked at full economy only when the burning of refuse is quite continuous and uniform. To do this we must have storage of some kind. In hilly countries the plan I have advocated of water storage is generally available and is very economical. In all other cases thermal storage is far and away the most economical mode of working, and, in this line alone, if in no other, I have always said, from the first moment I knew of Mr. Halpin's invention, that we have here the last item which was wanting in order to do away with the barbarous methods generally adopted for getting rid of house refuse, and, at the same, utilizing that refuse in a manner that will confer material benefits on all the inhabitants of a great town, and pecuniary advantages on those who undertake the work.

\* A paper read at the St. Louis meeting of the National Electric Light Association.

### The Lalance & Grosjean Mfg. Company's Rolling Mill.

The Lalance & Grosjean Mfg. Co. who, at their great works at Woodhaven, Long Island, N. Y., are among the largest consumers of sheet iron and steel, have added to their equipment a new plant at Harrisburg, Pa. Starting with the determination and the ability to provide for the best facilities, their new sheet mill takes rank not alone as a thoroughly modern establishment, but as a model works. It is for this reason that it is worthy of special interest.

A number of considerations led to the building of the mill. It enables the firm to control their own supply, in quantity and quality, not alone of the steel sheets used for the production of ordinary grades of stamped ware, but also of the special iron sheets required for the successful production of the enameled goods for which the concern are famous, particularly their "Agate Iron Ware." While excellently located for the manufacture and distribution of their finished articles, the works are somewhat remote from the source of raw material, the sheets, particularly when the additional circumstance is taken into consideration that the considerable quantity of scrap necessarily produced cannot be marketed to advantage.

In choosing its location at Harrisburg, in close proximity to supply of raw material, in a district where skilled labor is abundant and fuel is cheap, the economical production of sheets was readily attainable. It is the purpose of the firm to add to the Harrisburg plant a sufficient number of cutting presses to do as much of the preliminary blanking on the spot as possible, so that the scrap produced can be at once piled and rerolled.

Last May, ground was broken at a point near Harrisburg and on the main line of the Pennsylvania Railroad. An iron building was erected, 220 x 208 feet, consisting of two spans 84 feet wide, with a lean-to 40 feet wide, the iron work being done by the Pennsylvania Steel Company of Steelton, Pa.

In the general arrangement of the mill one leading thought has guided in the plan: That from the raw material to the finished product the material flows through the mill continuously in one direction, never returning or doubling up upon itself. The trains are located in a position parallel to the center line of the building.

The raw material consists of two classes, soft open-hearth steel and iron which is specially produced in this plant. Since it is probably the only locality in this country in which the process is carried out, some reference to the method may be of interest. It has been in use at one establishment in Wales. A special charcoal iron is worked in two runout refineries, with coke, the refined iron being tapped direct into the knobbling fires, of which there are two for each refinery. The product of the knobbling fires goes to a 5000-pound hammer, where it is drawn down to blooms, which are reheated and rolled into bars. The latter are cut up, piled and hammered and are cut into two parts. The doubled pile blooms are heated to a welding heat in two hollow fires in which coke is used and are again drawn under the hammer to blooms, which form the raw material for the manufacture of iron sheets, the capacity of the present plant being between 50 and 60 tons of iron per week. It has been found that this is the only material suitable for the manufacture of flawless enameled ware.

The raw material for the steel sheets, which of course comprise the greater part of the product of the mill, are soft steel billets, the standard size used being 6½ x 4 inches, the length varying with the weight required.

The billets are heated in two direct-fired reverberatory heating furnaces and then go to a three high 22-inch bar mill with bull heads at the end. The train is driven by a 30 x 48 inch horizontal engine with 25 foot fly wheel, weighing 30 tons. It is backed by a shear, driven, like all the shears in the plant, by an independent engine. This shear is capable of cutting cold an 8 x 2 inch section.

Stretching nearly the whole length of the mill are the sheet mills, with their equipment of shears, furnaces, &c. There are two trains in a line, each train having its own engine, the two being side by side in the center of the mill. These engines, built by Tod & Co. of Youngstown, Ohio, are 30 x 60 inches, with 30 foot fly wheel, weighing 40 tons. Facing the trains, the one to the left consists of four mills and one cold-rolling set, all 24-inch, with 18-inch necks, capable of rolling up to 24 inch width. The train to the right has five sets of rolls, of which four are hot rolls, capable of rolling No. 32 gauge up to 48-inch width, while the cold rolls, which are at the end furthest removed from the engine, are capable of rolling 50-inch. This train differs in this respect from the other, that between the second and third set pinions are introduced by which the upper roll of the second and third stands are driven. They act as roughing rolls. All the housings of the finishing sets have two screws, so that the rolls can be set closer and can be kept more accurate. The housings and the entire trains are built exceptionally heavy, it being stated by Robinson, Rea & Co., of Pittsburgh, who furnished all the machinery and iron work, except where otherwise designated, that the mill is undoubtedly the heaviest thus far put up in this country. Extraordinary care was taken in the foundations for the train. They went down to the slate-rock for a foundation, which was built up of hard-burnt brick and the best cement. We understand that when the work was completed there was not a difference of more than 1-16th inch in the level of the two ends, the whole length being 195 feet 6 inches.

The foundation is prepared and bed plate extended to allow of placing an additional stand of cold rolls at the end of each of the trains, should it become necessary. A small vertical engine to drive slow-speed gear is now mounted at the end of both trains, which may be quickly coupled to the lower roll. A slot is provided at the side of the housings of each stand, which receives a slide, upon which a turning tool can be mounted. In this way the rolls may be turned in place without running the main engine.

Along the whole length of the trains runs a track, upon which are placed two cranes which command the trains, and may be used for changing rolls, &c. For new rolls a special roll-turning lathe is provided.

The right-hand train is backed by one sheet and one pair furnace for each mill, two doubling shears being located between the heating furnaces and the mills. Beyond them are crocodile shears.

The left-hand train has four heating furnaces like the others, fired with bituminous coal, and having a hearth of 11 feet 7½ inches by 6 feet 6 inches. The shearing for this train is done by plunger shears.

In the lean-to is placed one draft reverberatory annealing furnace of a Welsh design for the smaller sizes of sheets, while two box annealing furnaces are at the other end for the ordinary run of work.

An emery wheel is provided for grinding the shear knives, &c. Along part of the wall is ranged the steam-raising plant, consisting of ten boilers, built by the Harrisburg Foundry & Machine Company, the aggregate capacity being

1250 horse-power. Six are kept running, while four are in reserve. They are fired with anthracite pea coal. They are controlled by a Locke regulator, made by Locke Bros. of Salem, Mass., so set that a uniform pressure of 100 pounds is maintained. All the exhaust steam from the different engines goes to a Webster heater, which is doing good service.

The water supply for the mill is obtained from nine wells, of which four are about 75 feet deep and five are 40 feet deep. The water has been pronounced purer than Croton or Ridgewood by a New York firm of chemists. It is pumped by Knowles pumps into a 20,000-gallon tank. The feed-water pump is a vertical Worthington.

All the foundations drain to a shallow well, into which for safety sake a small syphon has been put.

It will be observed that in its general arrangement, its equipment and in the thorough working out of all its details, this new plant of the Lalance & Grosjean Mfg. Company has been given the closest expert study. It is not surprising to learn therefore that its product is expected to come up to 10,000 gross tons per year, a part of which will probably be placed on the open market.

How the Government at Ottawa views the conference which took place a year ago in Washington City between Mr. Blaine and the Canadian minister appears in the comments made by leading journals in Canada in reference to that occurrence. To quote the words of the official record now published, Mr. Blaine held that "no other arrangement but one of unlimited reciprocity would suit the United States, and that it must be accompanied by discrimination in favor of the United States, especially against Great Britain, who was their great competitor, and that it must likewise be accompanied by the adoption of a uniform tariff for the United States and Canada equal to that of the United States." Mr. Blaine, according to the *Montreal Gazette*, "proposed such conditions as would make Canada the permanent commercial vassal of Washington."

On February 1, 1892, the new French tariff, with its general increase of duties, became effective; and in view of this, the results of the foreign commerce of the country for 1892 are more than usually interesting. From the official returns it appears that the foreign trade last year amounted to 7,975,288,000 francs, of which 4,412,379,000 francs represented imports and 3,562,909,000 francs exports. Compared with the previous year, these figures show a falling off in last year's trade of 355,488,000 francs in imports and 6,828,000 francs in exports.

The enterprise of the new State of Washington knows no bounds. Seattle is now talking about establishing a steamship line to Panama. It is calculated that the profits on freights of coal to be disposed of to steamers plying to the Isthmus would alone warrant the promoters of the line in the undertaking. Moreover, they argue, a profitable business could be done in the exchange of flour, wheat, lard, canned meats, lumber and railroad material for the coffee, rice, fruits and other staples of Central America.

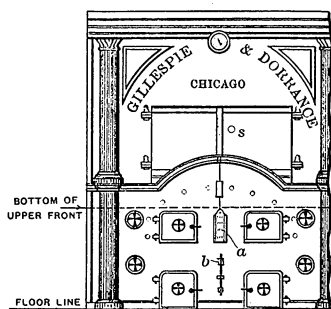
A project having for its object the construction and equipment with private capital of the long-talked-of ship canal between Lake Erie and the Ohio River is receiving the serious consideration of Pittsburgh capitalists as well as financiers from other large business centers. The first practical move toward carrying out this immense project will be started at a meeting to be held in Pittsburgh 20th inst.

## The Gillespie Smokeless Furnace.

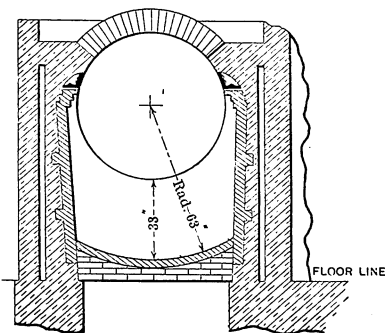
As has been frequently stated in these columns, the correct application of the mechanical principles requisite for the prevention of smoke from fuels rich in volatile hydrocarbons must necessarily result in a more economical consumption of such fuel. This, of course, is due to the fact that the means employed for effecting the more perfect character of combustion required for consuming or preventing the formation of smoke must also result in the utilization of a larger proportion of the strictly gaseous products of the imperfect initial combustion of the fuel on the grate or its equivalent. The gain in economy is not only capable of proof by theoretical calculation, but has been very clearly demonstrated by

cessful. Among the latest examples of this type of furnace is that of Wm. C. D. Gillespie, chief engineer of The Rookery, one of the largest and finest of the many fine office buildings in Chicago. The use of soft coal for the extensive steam plant necessary to furnish power for electric lighting, elevator service, &c., naturally caused a very objectionable amount of smoke, the prevention of which was the principal object of Mr. Gillespie's experiments, which have resulted in the production of the furnace shown in the accompanying drawings. After having been in continuous operation for several months, during which very careful observations of comparative efficiency were made, a series of evaporation tests was conducted by the well known engineering firm of Robert W. Hunt & Co. As the drawings show so clearly the construction of the furnace,

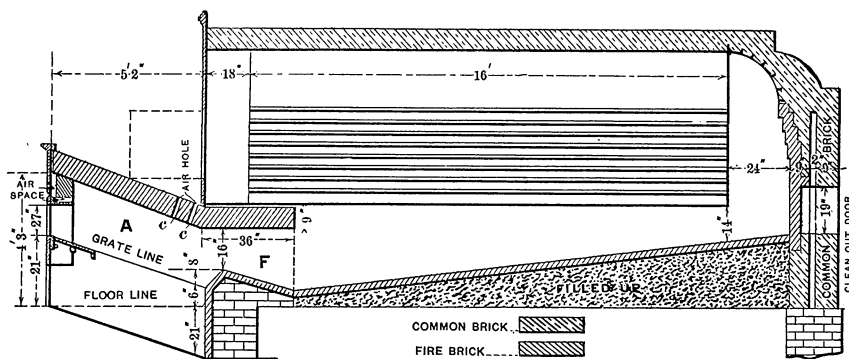
only is used (about  $\frac{1}{16}$  inch of water), the mass of flame generated completely fills the furnace, and extends well into the tubes at all times during normal condition of the fires. This, with the high velocity of flame, gives a very high rate of efficiency, as shown by the report, and that this is not gained at the expense of economy is seen in the evaporation results. By means of an improved shaking grate, the levers of which are shown at b, Fig. 1, the manipulation of fires by the use of ordinary fire tools is dispensed with, and the furnace doors need only be opened for feeding. As observed in the Rookery boiler room, the fires require very little attention, as compared with those in ordinary boiler setting, and but average skill on the part of the fireman is necessary to enable him to carry practically smokeless fires. The important feature of durability is demonstrated by the fact that these furnaces have been in continuous operation, without repairs, for several months, and show no sign of deterioration over and above what would be due to wear and tear in an ordinary furnace. As seen by the drawings, there are no complications in construction, and where applied to new plants, the cost of labor and material need be very little more than that of the regular type of setting. It will be observed also, from the drawings, that the construction of the combustion chamber is such as to cause the reverberated flame to be of nearly uniform temperature throughout, and that, while completely enveloping the exposed surfaces of the boiler, there is no direct impingement on any portion of the latter—a fact, the importance of which



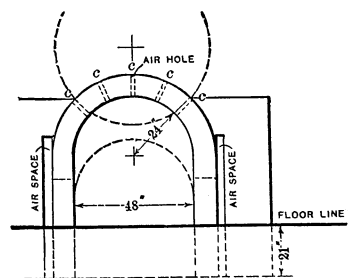
*Fig. 1.—Front Elevation.*



*Fig. 2.—Cross Section at  $r'$ , Fig. 3.*



*Fig. 3.—Longitudinal Section.*



*Fig. 4.—Section Showing Air Holes.*

## THE GILLESPIE SMOKELESS FURNACE

practical applications of the theories, made during the past three or four years. Whether smoke prevention, economy of fuel, or both, be the primary object sought, its accomplishment will involve changes from the ordinary forms of furnaces, more or less expensive, according to the degree of simplicity or complication in the device employed. Where, however, this outlay—be it great or small—effects any appreciable saving in cost of operation, it becomes not an expense, but an investment of capital capable of earning a certain percentage of profit. This fact, once given general recognition, must result in the wide adoption of such devices, and smoke prevention will become one of the important business economies, of which the benefit to the general public, from a purer atmosphere, will be an accidental result, rather than the principal desideratum. In Chicago, the energetic crusade of the Society for the Prevention of Smoke has directed the attention of engineers to this subject as an important field for profitable investigation, and the result has been the development of a number of devices, more or less suc-

any detailed description will be entirely superfluous, though some of the more important features may be briefly referred to. The principal air admission is through the grates, and is regulated by means of the ash pit doors, as usual. There is, however, a supplementary admission at the back end of the roof arch, through the holes C C &c., shown in Figs. 3 and 4. Also, the counter-weighted air valves A, Fig. 1, are opened at the moment of firing, to prevent the formation of smoke from the excessively rapid distillation of the volatile hydrocarbons, for which the regular air supply would be insufficient. These are closed within two or three minutes after firing. The effect of this admission is very marked, and may be readily observed through the peep holes s in the front connection doors, Fig. 1, which are drilled exactly in line of the center of one of the boiler tubes, through which the mass of flame in back connection is seen. By manipulating the valves the flame is seen to become dull red and smoky, or clear and bright, according as the valve is opened or closed, the effect being almost instantaneous. Although the stack draft

will be readily appreciated by engineers. From the satisfactory results obtained from this initial application Mr. Gillespie has recently decided to place the furnace on a commercial basis, and with the immediate result of an order for the equipment of the entire plant of the Hardy Subterranean Scenery Company of Chicago, consisting of a battery of three 60 inches by 16 feet horizontal tubular boilers.

The very thorough and complete tests made of this furnace by Robert W. Hunt & Co. demonstrate not only the perfect combustion obtained, but also the very decided economy in steam-generating qualities of the device.

A link of railway is to connect the Sault Ste. Marie Canal with the Canadian Pacific, and it is said that in winter a large proportion of the Canadian Pacific traffic will take this route.

The Mexican Government refuses to entertain any overtures for a lease of the railroad across the Isthmus of Tehuantepec which contemplate a foreign control of that property.

## Treasury Decisions.

*Oxide of Zinc Powder.*

Before the United States General Appraisers at New York, February 8, 1893. In the matter of the protest, 17,218-3348, of Bass Huetter Paint Company, against the decision of the Collector of Customs at San Francisco, Cal., as to the rate and amount of duties chargeable on certain oxide of zinc powder, imported per "Edenballymore," August 17, 1892. Opinion by Wilkinson, General Appraiser.

The appraiser reports that the merchandise is oxide of zinc powder, containing from 1.05 per cent. to 3.7 per cent. of lead. It was assessed for duty as white paint dry, containing lead, at 3 cents a pound, under Paragraph 67, N. T., and is claimed to be dutiable at  $\frac{1}{4}$  cents a pound under Paragraph 60.

Paragraph 60 provides for "Zinc, oxide of, and white paint containing zinc, but not containing lead." Paragraph 67 is in a list entitled "Lead Products."

It is in evidence that oxide of zinc commonly contains impurities found in the metal zinc, and that lead is an element in this foreign matter. It is unnecessary in the present case to determine whether the limitation in Paragraph 60 applies to oxide of zinc or not. The merchandise is dry oxide of zinc, and so commercially known, and the percentage of lead contained is too insignificant to make the article dutiable as a lead product.

The protest is sustained accordingly.

*Copper Ore—Fire Assay.*

Before the United States General Appraisers at New York, February 4, 1893. In the matter of the protest, 33,635a and 36,258, of the Pennsylvania Salt Mfg. Company, against the decision of the Collector of Customs at New York, as to the rate and amount of duties chargeable on certain sulphur ore, imported per "Rio Tinto," July 5, 1892, and "Coventry," August 22, 1892. Opinion by Wilkinson, General Appraiser.

The question is the proper mode of determining the amount of copper in sulphur ore which contains copper. Paragraph 133 provides that sulphur ore containing more than 2 per cent. of copper shall pay an additional duty of one-half of 1 cent per pound for the copper contained therein.

In the present case the assay was made by the electrolytic process. The appellants claim that the fire assay should have been adopted. By the first method a portion of ore is dissolved and the absolute amount of copper contained is precipitated. On account of loss in working, ore is usually bought and sold by what is termed a fire assay. But from the simplicity and accuracy of the electrolytic method and by common agreement in the trade the so called fire assay or commercial assay is determined by deducting 1.3 per cent. from the sum given by the electrolytic or wet process.

In deciding a case of this kind (Synopsis 10,037, May 26, 1890) the Department says that, after conferring with the Superintendent of the Mint, the conclusion is reached that the "fire or dry assay" should be used by customs officers in such cases. Congress is supposed to have had cognizance of the method of assay followed by the Department just prior to the passage of the act of October 1, 1890; and as there is no substantial change in the phraseology of the new law in the provision for sulphur ores containing copper there appears to be no reason to modify the regulations of the Department as given in the decision named.

We hold that the amount of copper should be determined by fire assay, and that the fire assay may be ascertained according to conventional usage by deducting 1.3 per cent. from the result of the electrolytic assay. To that extent the protests are sustained.

*Toys—Certain sets of knives and forks not.*

Before the United States General Appraisers at New York, December 13, 1892. In the matter of the protest, 31,574a-16,954, of Strauss, Sachs & Co., against the decision of the Collector of Customs at New York as to the rate and amount of duties chargeable on certain knives and forks, imported per "Etruria," June 14, 1892. Opinion by Ham, General Appraiser.

The merchandise here consists of cards holding a knife, fork and spoon, constituting a set described thereon as "a memento of affection for my juvenile friend," assessed for duty at 10 cents per dozen and 30 per cent. ad valorem, under Paragraph 167 of the new tariff act, but claimed to be dutiable as toys at 35 per cent. ad valorem, under Paragraph 436 of said act.

The case was heard November 1, 1892, and submitted on samples, verified by the oath of one of the appellants. Each set consists of a bone handled table knife of metal, 7 inches long, a metal bone-handled fork to correspond, and a metal spoon of the ordinary size of a teaspoon. The invoice price of the two sets represented by samples is 12s. 9d. per gross. In testifying in regard to the value of the merchandise, appellants swore that the sets covered by the importation, but not represented by samples, were of the same size, but of "a little better quality." An inspection of the invoice and a cross-examination of the witness showed that they cost from 29s. to 75s. per gross, or from three to six times more than the sets represented by samples.

We find as facts:

1. That the importation was made under the new tariff act; and
2. That it consists of sets of table knives and forks suitable for use by adults as well as children.

This case is analogous to that considered in G. A. 1053, where a protest claiming on similar grounds to the claim of the protest here was overruled on the familiar principle that a specific enumeration controls as against general terms.

Following the rule of the case cited, the protest is overruled and the decision of the Collector is affirmed.

*Small Grindstones Not Whetstones.*

Before the United States General Appraisers at New York, December 22, 1892. In the matter of the protests, 29,749a-14,643, of G. W. Sheldon & Co., against the decision of the Collector of Customs at New York as to the rate and amount of duties chargeable on certain grindstones, imported per "Magdalene," June 2, 1892. Opinion by Somerville, General Appraiser.

The present tariff act (Paragraph 129) levies a duty of \$1.75 per ton on "grindstones, finished or unfinished."

Paragraph 608 puts on the free list "hones and whetstones."

The merchandise under consideration is claimed to be free of duty under the latter paragraph as whetstones.

We find the facts as follows:

1. The goods are invoiced and entered as 37 casks of whetstones.
2. The sample accompanying the papers is a correct representative of the merchandise, being, in geometric shape, a solid wheel of stone, about 4 inches in diameter and  $2\frac{1}{2}$  inches in altitude. It is apparently of sandstone, and contains a hole drilled through the center suitable for the insertion of a small spindle.
3. We find that the article is in fact a grindstone, and not a whetstone.

A whetstone is a stone commonly used for sharpening cutlery or tools by friction. The tariff act, in enumerating this article, associates it with "hones," to which it is analogous in use.

A grindstone is either of the millstone variety, or else it consists ordinarily of a solid wheel of stone, made to be turned by a handle or other power, and is used for grinding, sharpening or polishing.

This distinction between the two kinds of stones is clear and well marked.

The protest is overruled and the Collector's decision affirmed.

*Muzzle Loading Shotguns.*

Before the United States General Appraisers at New York, December 29, 1893. In the matter of the protests, 33,405a-8240, of Wiebusch & Hilger, against the decision of the Collector of Customs at New York as to the rate and amount of duties chargeable on certain muzzle-loading shotguns imported per "Sparndam," December 29, 1890. Opinion by Sharretts, General Appraiser.

We find from the testimony of the appellants in this case that prior to importation certain muskets were converted into muzzle-loading shotguns by the following process of manufacture, namely:

1. Cutting several inches from the barrels at the muzzle.
2. Shortening the fore ends of the stocks (which originally extended to within a few inches of the muzzle) and making the stocks similar in form and length to those of the ordinary fowling pieces.
3. Removing certain of the swivels.
4. Reboring the barrels of such as were rifled.

The foregoing process of manufacture destroyed the usefulness of the firearms in question as weapons of war, and, as before stated, converted them into muzzle-loading fowling pieces, in which condition they were imported into the port of New York, and there entered for consumption subsequent to October 6, 1890.

Paragraph 169, under which the appellants claim the articles in question are dutiable, provides for muskets and sporting rifles. Webster defines a musket as a species of firearms carried by infantry, &c. The same author defines fowling pieces as a light gun for shooting fowl or birds. In commercial parlance the terms shotguns (fowling pieces) and muskets are not interchangeable. The conversion of a musket into a fowling piece by a process of remanufacture, in our opinion, removes it from classification as a musket. The fact that many, if not a majority of muskets are now used for shooting fowls, birds or other game has no bearing upon the case. It is only firearms which were commonly or commercially known as muskets and rifles at and prior to the passage of the act of October 1, 1890, that are included in the provisions of Paragraph 169.

We make further findings of facts:

1. That the merchandise is a manufacture of metal, or of which metal is the component material of chief value.
2. That the articles in question are not commercially known as, nor are they in fact, muskets.

Muzzle-loading shotguns are not denominatively provided for in the present act, and we hold that duty was correctly assessed thereon by the Collector at 45 per cent. ad valorem, under Paragraph 215 N. T.

The protest is overruled and the Collector's decision is affirmed.

It is reported that a more powerful forging press than that now at the Homestead works has been ordered from Whitworth for that plant, at a cost of \$500,000.

The lease of the Industrial Building on Lexington avenue and Forty-third street to the United States Government has been completed, and the building is thus secured for an uptown post office. It is understood that arrangements will be made with the New York Central Railroad by which the four tracks which formerly ran into the Industrial Building will be relaid, so that railway postal cars may receive their mails direct from the new Post Office.



## THE WEEK.

The elevator capacity of the head of the lakes is at present 21,200,000 bushels. The only two cities in the country which have elevator capacity in excess of this amount are Chicago and New York, that of the former being 30,075,000 bushels and the latter 27,275,000 bushels. The elevators are now crowded to their utmost. To care for the surplus lines and to open new territory, elevators are now being built in Superior for an additional capacity of over 6,000,000 bushels and in Duluth of over 1,000,000 bushels, which will place Superior-Duluth second in the United States in point of elevator capacity.

A bill passed the Pennsylvania Senate almost unanimously increasing the maximum limit of capital of corporations from \$10,000,000 to \$30,000,000. The bill is in the special interest of the Cramp Ship-building Company.

The aggregate resources of the 25 savings banks of New York City exceed \$390,000,000. Their surplus beyond the amount due depositors is \$50,000,000.

The North Carolina Legislature passed a State banking law, the basis of paper issues to be the 4 per cent. bonds of the State. United States bonds and coupon notes to run for not less than five years, secured by mortgage on real estate.

The German Reichstag is divided on the question whether to build new battle ships or to modernize the armaments of those already built.

To protect themselves against the proposed leather trust, shoe manufacturers throughout the country talk of going into the tanning business themselves.

Retail merchants in New York City protest against the proposed extension of the factory laws relating to the employment of labor so as to include a supervision of the management of their business by the State inspectors.

The height of buildings in Chicago is limited by a municipal ordinance to 130 feet, or ten stories. In New York lofty buildings on narrow streets, by excluding the sun and retarding atmospheric circulation, are supposed to be prejudicial to health.

The North American Navigation Company, the rivals of the Pacific Mail Steamship Company, inaugurated their service 9th inst., their first vessel leaving San Francisco for Panama with a full cargo of passengers and freight. It is expected that the line will play an important part in transoceanic rates if it is not absorbed by some of the older lines.

In numerous instances in the lower part of this city escaping steam from underground pipes follows the Croton conduit until the water supply becomes too heated for drinking.

There is money in sugar refining. Last week \$4,500,000 were disbursed in dividends by the Sugar Trust and \$5,000,000 more remain in the treasury.

Philadelphia complains that she is rapidly losing her grain trade owing to alleged discriminations in favor of Baltimore.

Southern Brazil is again in trouble and relations with the neighboring republic are badly strained. Chili and Argentina are reported to be making faces at each other. Honduras has two revolutions at the same time and Nicaragua is liable to become involved.

The withdrawal by President Cleveland of the proposed Hawaiian treaty is understood to mean that negotiations with the commissioners will be reopened upon a different basis.

A foreign corporation doing business in Massachusetts is not liable for taxes upon its personal property there, under chapter 11, section 20, of the Public Statutes. The full bench of the Supreme Court so decided on the 9th inst. in the suits of the Boston Investment Company and others against the city of Boston.

The first French oil-tank steamer for the American trade was to have been ready for launching at Havre 15th inst.

Altogether four men have been prostrated by compressed air in the East River tunnel, building for the conveyance of gas from Long Island City, and all are expected to die.

A navigation company, with a New York millionaire at their head, have been organized to run three large passenger steamers between Toronto, Rochester, Oswego, Montreal and other points.

Growing wheat in Texas looks finely and the acreage sown is larger than ever before.

Fire Island has been purchased by New York State for \$210,000, for quarantine purposes.

Lumber combines are forming North and South to secure control of the largest possible amount of growing timber. At Toronto a syndicate is in course of formation which will include some of the largest operators in Michigan and Canada, and options have been secured on several thousand square miles. The name of Governor Alger of Michigan is prominently mentioned.

The struggle between railroad corporations to obtain control of New England transportation is a characteristic of the times. It was initiated by the overreaching of President McLeod of the Reading, and others were compelled to resort to similar methods for self protection. How to divide the territory is now the question, unless a battle for receiverships has the precedence.

Shares of numerous trust companies formed in England a few years ago, when a mania for this sort of enterprise was prevalent, are now either greatly depreciated or wholly unsalable. The London *Economist* says: "Week after week evidence accumulates, proving only too forcibly that those responsible for the management of these trusts have based no inconsiderable part of their operations upon false principles, with the inevitable result that, after a more or less brief period of apparent prosperity, losses and difficulties have arisen, and unless greater foresight and ability is displayed in the future than has been shown in the past, it is highly probable that collapses of a disastrous kind will take place."

Austro-Hungary has had good success in the efforts for currency reform, nearly \$14,500,000 in gold having been obtained from America, England and Paris, without influencing the policy of the national banks. The remainder to be obtained will not be urgently pressed.

The movement among manufacturers in the Ohio oil and gas regions to remove many of their plants to Western Pennsylvania because of the decline of the fuel gas supply in the Ohio territories has been followed by a lively renewal of prospecting in Eastern Ohio. Gas for fuel is the principal demand.

Massachusetts has made marvelous progress in manufacturing during the last 30 years. In 1865, as stated by Horace G. Waldin of Boston, in a lecture on the industries of that State, the manufacturing capital of Massachusetts was \$133,000,000; now it is \$600,000,000. Then the annual productions amounted to \$256,000,000; now they amounted to \$875,000,000.

During the fiscal year there were organized under the laws of New York 156 corporations, including corporations whose capital stock was increased. The aggregate amount of capital of such corporations is \$230,992,904, the tax paid thereon being \$266,241, an increase over the preceding year of \$80,704.

The shortage of cars is still a subject of grievous complaint at various Western points, but is felt with special severity at Kansas City. The superintendent of car service in that section says the trouble is caused very largely by sending cars long distances without transferring, to New Orleans and Baltimore, for example, so that they are longer returning. It requires five times the number of cars to do the business, now that they are permitted to go through.

An authority on manufacturing says that since the beginning of the new development of cotton manufacture in the South, results justify the statement that cotton goods can be produced cheaper in the Southern part of the United States than in any other part of the world. Many of the new factories in the South have made larger profits than New England or English mills.

A Pittsburgh firm have received, through their agent in France, a very large order for telegraph and telephone cables for use underground. The cable will be made in France by American machinery yet to be made.

The total value of all real estate in Pennsylvania in 1891 was \$2,256,151,310, while for the year just closed the amount returned is \$2,543,567,984, or an estimated increase of the value of all real estate in the commonwealth of \$287,416,674.

A new treaty between France and Canada is designed to promote the interchange of a variety of products, but the list affected is comparatively small. The arrangement follows the same lines as that between France and the United States, the reductions of duty being limited to a certain number of articles, the trade in which is of about the same amount on each side.

The United States Treasury now has in stock nearly 5000 tons of pig silver, but the price does not advance. On the contrary, sales at the current market price would entail a loss exceeding \$100,000,000.

In the New York Assembly, 9th inst., a franchise "to construct, maintain and operate pneumatic tubes for the transmission of mails, newspapers and parcels within and between New York and Brooklyn" was given away to a corporation.

The steamship "Paris," of the American line, to have sailed from this port on Saturday, 11th, was detained by the discovery of a fracture in one of her crank pins.

The annual catalogue of the Massachusetts Institute of Technology shows that of the 132 graduating members of the class of 1892, 22 graduated in civil engineering, 26 in mechanical engineering, 4 in mining engineering, 36 in electrical engineering, 4 in chemical engineering and 6 in sanitary engineering. The total registration this year has been nearly 1100.

A Berlin correspondent, discrediting the reports of negotiations in progress for a new commercial treaty between the United States and Germany, says: "It is likely enough that, should the disposition of the new American Government be favorable, Germany might try to make some commercial arrangements with the United States, but there is little chance for a treaty which would materially improve the commercial relations between both countries."

# The Iron Age

New York, Thursday, March 16, 1893.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.  
CHAS. KIRCHHOFF, - - - EDITOR.  
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.  
RICHARD R. WILLIAMS, - - - HARDWARE EDITOR.  
JOHN S. KING, - - - BUSINESS MANAGER.

## Lake Superior Charcoal Iron.

At the request of prominent manufacturers of Lake Superior charcoal pig iron, we have instituted inquiries covering the prospects of the trade for the coming year. It was known that quite a number of the furnace companies in Michigan and Wisconsin had experienced much difficulty in securing a sufficient supply of wood to run their works during the coming summer. The rigorous winter is assigned as the cause. It occasionally happens that winters will be very mild, with so little snow that the accumulation of wood is not an easy matter, and charcoal then becomes more costly than the average of several seasons. The past winter was of precisely the opposite character, but it was altogether too wintry, leading to the same result—namely, scarcity of wood. From this and other causes operating simultaneously, it is expected that the production of Lake Superior charcoal iron will be cut down this year, and that the cost of the iron which is made will be somewhat enhanced. The information we have received from the different manufacturers confirms this impression. All of them have reported to us but one, and fortunately that one is so situated that the facts concerning it were comparatively easy to secure elsewhere.

Extracts from the reports received bear as follows upon the fuel question: "Almost every furnace that I know anything about is having trouble, and in order to get what wood they are getting it is necessary to pay from 15 to 25 cents a cord more than last year." . . . "During January and February our fuel supply fell 25 per cent. below the average. The cost thus far is about 3 per cent. dearer." . . . "Our wood supply is from 5 to 10 per cent. short of last year's, and the charcoal will cost  $\frac{1}{2}$  to  $\frac{3}{4}$  cent more per bushel." . . . "We are today 50 per cent. short of what we had on hand this time last year, and wood costs us 25 and 30 cents per cord more than last year." . . . "The fuel supply at our furnace is short at present, owing to snow blockades, and charcoal costs us  $\frac{1}{2}$  cent. per bushel more." . . . "Our supply is 25 per cent. short of last year and charcoal is  $\frac{1}{2}$  cent per bushel of 20 pounds dearer." . . . "Our wood will have to be cut during the summer, as very heavy snows have made chopping almost impossible, hence the cost will be considerably increased." . . . "We will have a shortage of at least 20 per cent. in our fuel supply, and it will be enough dearer to make quite an item of expense." . . . "Our charcoal is now costing us  $\frac{1}{2}$  cent per bushel more than usual." Some furnaces, perhaps accident-

ally favored by local conditions, report a full supply of fuel at no advanced cost, but they are exceptional.

In addition to information on the subject of fuel, we have also received estimates from the different furnace companies of their production of pig iron in 1893. On totaling these estimates, we find that the present expectation of the year's output is considerably below that of last year. The owners of not a few furnaces advise us that they are making no preparations for a blast this year, perceiving no inducement in the present condition of trade to undertake the task of collecting materials and converting them into merchantable product. On the other hand, there are some furnaces which have been out of blast for several months, one that is being removed to a new location, and another that has recently been built, all of which will be active producers for at least a part of the year, and have advised us of their probable product. Totaling these figures, we have an estimated product of 242,000 gross tons of charcoal iron in 1893 in Michigan and Wisconsin, as against 266,547 tons reported for 1892 by the American Iron and Steel Association.

The production of Lake Superior charcoal pig iron this year thus forecast will be, if it proves to be an accurate estimate, the lowest for five years. Following is the record: 1892, 266,547 tons; 1891, 307,237 tons; 1890, 315,615 tons; 1889, 263,235 tons; 1888, 252,686 tons. During this period of five years the general consumption of pig iron in the United States has increased 33 $\frac{1}{4}$  per cent. If the consumption of Lake Superior charcoal iron were in harmony with this condition of the general iron trade, it would be necessary to produce in excess of the great output of 1890, when 315,615 tons were made. The charcoal iron trade, however, is a special line which may or may not proceed in harmony with other branches, but is particularly affected when prices of all pig iron are very low. A comparison of unsold stocks at furnaces may be more instructive than to compare production and consumption with other kinds of pig iron.

At the close of the best year in recent times, 1890, the stock of unsold Lake Superior charcoal pig iron on hand was less than 20 per cent. of the year's output, or only 62,475 tons. The consumption in that year was 232,000 tons, in round numbers. The consumption in 1892 was in excess of the production, as stocks were reduced 44,534 tons from January 1 to December 31. Adding the production, 266,547 tons, to the reduction in stocks, the total consumption was 311,081 tons. The estimated output for 1893 falls considerably below these figures, being but 242,000 tons, as previously stated. Unsold stocks at the beginning of the year, according to the American Iron and Steel Association, were but 44,816 tons. Adding these to the estimated output, the total supply now in prospect still falls below the consumption of 1892. The slight increase in stocks which has taken place in the past month or two is regarded as only temporary, partly because severe winter weather has checked shipments and partly because this is not the time of the

year to expect any considerable buying movement.

The charcoal iron manufacturers believe that the consumption of 1893 is more likely to surpass that of 1892 than to fall below it. There has been a decided increase in the number and capacity of malleable iron foundries, now constituting the leading consumers of Lake Superior charcoal iron. It is true that these foundries have substituted a considerable percentage of coke iron for charcoal in making some classes of malleable work, but it is believed that the limit has been reached and that therefore the consumption of charcoal iron is more likely to increase than to decrease in this line. It was supposed at one time that steel castings would ultimately displace malleable castings, but that expectation has been dissipated by the maintenance of high prices for steel castings in comparison with malleables. The car-wheel trade is also a better outlet for charcoal iron than had been expected, as steel wheels and built-up wheels are still much dearer than first-class cast-iron wheels.

From the above statement of facts and estimates the makers of Lake Superior charcoal iron should be able to extract much encouragement. Unless conditions greatly change, there appears to be no reason for lower prices this year, but, on the other hand, substantial ground to contend for a moderate advance.

## Bumping on the Rocks.

The slight tendency to higher prices recently manifested in some branches of the iron trade merely accents the generally unsatisfactory condition of business. Manufacturers load themselves with all the orders they can handle, and then advance quotations. They are busy as the proverbial bees on heavy contracts taken at cost or below it, and by advancing prices on small supplemental sales they unfortunately convey the impression that the trade generally has worked into better condition, and that thereafter some profit, or perhaps less loss, will be realized on the entire volume of business. It only requires a little contact with these same manufacturers, however, to realize the fact that the situation has not brightened materially. Seldom has the volume of business been so heavy as thus far in 1893. Some of the transactions which have come to light have been of really enormous magnitude, whether crude iron or finished products be considered. Only two or three years since such contracts would have sent prices skyward, but now the capacity for production is so great that values have hardly been affected. Illustrative of this point, a pig-iron manufacturer, who is known to have taken contracts far in excess of anything in his previous experience, was asked whether his works were not very well sold up for some months to come, and replied that he was ready to name a figure on 100,000 tons if anybody wanted such a quantity.

A peculiar phase of present conditions is the prevailing belief that prices are not likely to be much higher this year. Usually, in the most depressed times, sanguine souls are to be found who will adduce arguments in favor of higher



values, but now they are not risking their reputation for business prescience by making such predictions. Cautious manufacturers may hesitate to load themselves with large contracts for very long deliveries at current rates, because the unexpected may happen; but, generally speaking, sellers are willing to meet buyers on such a footing, and will take chances on future reductions in the cost of production to let them out whole or with some profit. Consumers themselves are almost surprised at the very favorable terms which they have latterly been able to make, surpassing anything previously known. They are convinced from their own knowledge of the cost of materials that manufacturers are bumping on the rocks of cost, and the recent failures of prominent concerns strengthen the conviction.

Looking forward, very little encouragement is to be gathered in favor of more profitable business. The financial situation is not reassuring. Farmers and planters are not so prosperous as they were. The events of the past two years have also weakened the faith of business men in the benefits of heavy crops, even if they are simultaneous with short crops abroad. The most sagacious financiers appear to be groping as blindly as the merest tyros in endeavoring to find a remedy for the troubled condition of general business. It looks now as though a lesson in the severe exercise of patience was being impressed upon us until such time as a general revival of trade is felt throughout the world. Meanwhile they will fare the best, in navigating the shallow waters of depressed trade, who put their crafts in order by further reducing cost of production wherever possible.

#### Machinists in the Navy.

The United States Navy is finding trouble in obtaining men of the desired quality as machinists. It has been repeatedly pointed out that this failure does not result from any reluctance to comply with the conditions generally imposed by a military service—cleanliness, discipline, and the privilege of going on shore. We think the true reason may be found in the fact that there is inborn in the American mechanic a strong ambition to advance himself. He is willing to begin at the lowest round of the ladder, provided he is assured there is a chance of rising. He is willing, and in fact prefers, to work with the understanding that promotion depends solely and only upon his ability and attention to business. Further than this, the ambition of the American mechanic, in nine cases out of ten, is never satisfied, because, no matter to which rung he may ascend, he always sees something higher to strive for. These aspirations are killed the instant he enters the navy, and, to express it in a left-handed way, he therefore stays out. He knows that the position of chief engineer will never be within his grasp, no matter how well qualified he may prove himself to be, and that even an assistant position with any responsibility will not be offered him. As far as advancement is concerned he does not enter the navy through the proper channel—he has not the requisite technical edu-

cation and has not been through a school of marine designing.

We should rather place "the costly machinery of a modern war vessel" in the hands of a man who had had long practical experience in the shop and in the care of machinery of a like character, than in the hands of the designer of that machinery who had had no practical experience. When everything is running smoothly the special qualifications of the chief engineer are of minor importance, but it is in the time of emergency, such as an accident to some part, that his skill and training as a mechanic are brought into play, and it is at this stage that wide practical experience proves superiority.

The advantages to be derived from the system of recruiting from the ranks are recognized in foreign navies and in the merchant marine of every country. Had it not been customary and possible for a man to enter the service at a low rank and finally rise to the highest, Chief Engineer Tomlinson would not have been in charge of the Cunard steamship "Umbria" when her shaft was recently broken in mid-ocean. This was a case of gradual promotion due to merit. It is not too much to assume that had Mr. Tomlinson known that a post of responsibility was beyond his reach he would not have entered the marine service. In the German navy the designing engineers serve on shore, and the engines are in charge of men recruited from the chief machinists. It will be seen that the machinist may rise to the grade of engineer-in-chief. Practically the same regulations govern advancement in the Austrian and Italian navies, and in the latter the mechanic may rise to the grade of a commissioned officer. In these countries the machinery is not in charge of scientifically educated engineers, but of men of practical experience brought, we might say, from the shop. More particularly in Germany, Austria and Italy, there are two distinct classes which in no way conflict with one another—the designer who has nothing to do with the care of the machine he creates, and the engineer who takes the machine as built and runs it to the best of his ability. Promotion follows the law of survival of the fittest and the path to the highest position is open to all.

One benefit that would result from increasing the prize to be sought by the machinist in the United States Navy would be the introduction of men of superior qualifications at the start. Having an incentive beyond their immediate pay to work for, better men would enter the service. Instituting a competition of this character would end in placing the best men in responsible charge, since only those of superior ability could rise.

In the courts at Pittsburgh last week, Bovard & Seyfang of that city, dealers in oil-well supplies, entered suit against the Pittsburgh Tube Company for \$7500 damages. The plaintiffs alleged that they guaranteed some oil-well tubing sold by the defendant company. The tubing leaked and a large quantity of oil was lost to the owners of the well in which it was used. Bovard & Seyfang had to make the loss good and now want to recover from the Tube Company the amount they expended in so doing.

#### Rural Electric Roads.

Extraordinary activity has characterized at least one class of undertakings lately, and promises to continue for some time to come. It was only last year that electric railroads first began to attract attention in a conspicuous manner, as a means for connecting adjacent towns and villages in different parts of the country. The first tentative enterprises of this kind were regarded very dubiously by moneyed men. We know of instances in which failure was predicted quite generally, and yet the lines proved exceptionally remunerative. It has become quite evident that when the facilities are afforded the desire to travel is greatly stimulated.

A good many of the rural electric roads have drawn heavily from the local passenger traffic of the standard railways, until in some instances the local trains of the latter have been abandoned. While probably the old railroads have been considerable losers, there are indications that some of them look at the matter in another light. Reports were current some time since that one of the greatest railroads in the country was considering the question of relieving its line of a multitude of slow local trains by building a system of trolley lines themselves. Only a few of our largest systems can claim that the necessity of such relief is pressing, and therefore the steam railroad interests are generally arrayed in opposition to the new passenger carriers. They may be expected to become more belligerent still whenever an effort is made by the rural electric lines to handle freight.

Thus far the greater part of the mileage of rural trolley lines has been laid on existing roads. In other words, nothing has been paid for right of way, franchise, or even for roadbed, which has given the rural lines exceptional advantages.

In different States the discussion is very active over the attitude of the Government, the definition of its rights, and the principles which should underlie the granting of franchises. It will depend upon the outcome of these struggles how much the construction of new lines will be encouraged. The present prospect is that this year will be very active in this line, bringing to manufacturers of track and line material, of equipment and of power a goodly share of business. The work which thus comes out is not of course impressive in quantity, so far as single orders go, but in the aggregate it is sure to be very large, and constitutes a welcome addition to the ordinary run of orders.

In connection with the new development of rural lines some very interesting developments may be expected. It is bound to influence in many ways the relatively barren intellectual life of a very considerable part of our people. It promises to give them greater freedom of movement and may to some extent counteract the tendency, so frequently deplored, to seek the larger cities.

The effect of electric and cable lines in our large towns has been very marked during the past few years. It has very greatly enlarged their area and has made it possible for workingmen to flee from the crowded tenements to establish indi-

vidual homes. While it is scattering the population over a greater area, it is concentrating the business portion of our cities in relatively small sections in which a series of great modern structures accommodate large numbers of tenants. Possibly one effect of rural lines will be to take the farmer away from the village store as a customer, and to deliver him over to the merchant in the larger though more distant town. If he can readily reach it he will prefer to buy from a number of dealers who have large and attractive shops than from the village general store-keeper who cannot offer so wide a variety of goods. It looks as though the rural lines will draw business to the smaller centers of population at the expense of the village and the hamlet.

#### Enlarging the Locks on the Erie Canal.

Capt. M. de Perry, who has been running steamers on the Erie Canal for the last 16 years, contends that if the plan for enlarging the locks were carried out to completion as originally intended, the capacity of the Erie Canal would be sufficient to permit the transfer of all the grain in the Northwest to the seaboard. He says that a steamer with these conditions, carrying 30,000 bushels, can pass into the Hudson River every five or ten minutes. At present, instead of operating a single boat in the Erie Canal, as was done for 50 years, we are actually running two and three and often four boats coupled together and handled by one wheelman. The trouble lies at the locks not thus far lengthened so as to admit of the passing of two boats without uncoupling. In 1887 the Legislature appropriated money to lengthen 16 locks, and up to 1890 38 locks had been lengthened, but for the last two years not a dollar has been appropriated to continue this work, and this year the Appropriation bill provides for the lengthening of only one lock. The locks between Buffalo and Albany, it is stated, could all be lengthened for \$3,000,000. Moving boats by electricity, as Governor Flower suggests, may prove to be cheaper than steam power, but Captain de Perry represents that it would not be safe to move boats any faster in the Erie Canal than the present steamers are moving them.

**The Bogert Turret Engine Lathe.**—In *The Iron Age* of last week we described and illustrated the Bogert turret engine lathe, but inadvertently omitted to state that the machine is built by John L. Bogert of Flushing, Long Island, N. Y. The lathe possesses many features adapting it especially for work demanding great accuracy.

Secretary Wilson of the New York Chamber of Commerce has prepared a statement showing the results of the purchase of silver by the Government, as follows:

Purchases.	Ounces.	Cost.
Under the law of 1878.	288,474,762	\$305,135,497
Under Sherman act to December 31, 1892.	129,926,735	127,237,410
<b>Totals</b>	<b>418,401,497</b>	<b>\$432,372,907</b>
Value at the present price of silver		351,457,257
Loss to the Government		\$80,915,650

The reading of these figures showing that the coinage of silver has cost the Government a loss of more than five and one-half millions of dollars a year made something of a sensation in the Chamber.

## CORRESPONDENCE.

### Some Suggestions on the Manufacture of Muck Bar.

*To the Editor:* I suggest that a cupola capable of smelting 2 tons of metal per hour be erected at convenient distance from two double puddling furnaces, each capable of holding 20 hundredweight, and that the iron be run into the furnaces in a fluid state. A machine should be put up to boil the iron until ready to drop, then the boiler should put his tool in and drop the iron ball and draw. This plan would greatly reduce the labor of boiling iron as compared with the old plan. A heat per hour could be produced, greatly increasing the output of superior quality of muck bar and also reducing the cost. The writer believes that 20 tons could be produced in 24 hours by each furnace, the puddlers working 8 hours each.

JAMES TAYLOR.

COVINGTON, KY., March 6.

### Whipple as a Thinker and Inventor.

*To the Editor:* The article in *The Iron Age* of February 23 on the "Lamination of Metals," and the reference to Professor Tyndall's theories on cleavage, recall to my mind a reminiscence of 50 years since, which may interest some of your readers, and to which they are welcome.

I was engaged in Lowell in 1843 or 1844 assisting the late Milton D. Whipple, an American inventor whose memory has never been fairly honored, in constructing a pantograph for engraving the copper rollers used in calico printing, when he informed me one day that he was going to Boston to attend a great scientific gathering, I think of the American Academy of Arts and Sciences, and propound to them what he called his "pasty theory" of geology, which was the very theory attributed to Tyndall in the article referred to.

He had often spoken to me of it and led me to believe it, and it was practically as follows—i.e., that much apparent stratification, especially in mica slates, was not produced by deposition, but by lamination, from pressure and motion.

He used the very same simile referred to "the rolling pin and pie crust," and said that the veins and nodules of quartz usually found in mica slate were "only the lumps of butter or suet which had not been properly rolled out!"

As I was very familiar with a slate formation of that character in the very town from which I now write, where the slaty formation crops out along the Connecticut Valley, though the greater bulk of it is on the Vermont side of the river and where the apparent "strata" are vertical and infinitely crumpled and filled with thin seams and nodules of quartz, I readily agreed with him. I do not remember now exactly how his discovery was greeted by the assembled geologists, of whom the late Professor Rogers of Pennsylvania was the president, but think they were skeptical.

I know Whipple did not say much about the meeting when he came home. He was a very original genius, a fellow townsman of Thomas Blanchard, of gunstock lathe fame; they were great friends and Mr. Blanchard used to visit him in Lowell.

In connection with his brother "Cullen" or "Colin," I do not know which, they got up machinery for the American Screw Company of Providence and the Douglas Axe Company, and Milton Whipple was, I believe, the original inventor of the "blowing machine" for cleaning South American wool. He also invented a machine for twisting the fringes of shawls and the file cutting machinery known by

his name, and at the time of his death was at work on a machine for combing cotton and one for making horseshoe nails automatically.

I think he was years before Tyndall in this question of lamination, and should not be surprised if Tyndall himself got the idea from the records of that meeting in 1844. Yours very truly,

PAUL WEBBER.

CHARLESTOWN, N. H., March 9, 1893.

## OBITUARY.

E. G. GILBERT.

Edward Granger Gilbert died at Troy, N. Y., March 7. His death was sudden and unexpected, being caused by angina pectoris. He was a son of the late Hon. Uri Gilbert, formerly Mayor of Troy. He was born at Troy in 1847. He was a graduate of the Rensselaer Polytechnic Institute, and after leaving immediately commenced an active business career with the Gilbert Car Mfg. Company of Troy. At the time of his death he was president of the company. Mr. Gilbert attended to all the large contract work of the company, and to his efforts much of the growth of the enterprise may be attributed. He was a member of the Troy Club, the Engineers' Club of New York City, and was at one time president of the Young Men's Association.

THOMAS FOSTER.

Thomas Foster, senior member of the wholesale hardware firm of Thomas Foster & Sons, Utica, N. Y., died at the Hotel Raymond, Pasadena, Cal., on the 23d ult. Mr. Foster, accompanied by his wife and Mr. and Mrs. Abbott Foster, had left Utica on February 6 for a several weeks' stay in California and Mexico, and was in the best of health at that time, so that his demise was altogether unexpected by his many friends. Mr. Foster was born in Whitesboro' September 20, 1820, and was thus in his 73d year. His father was David Foster, who moved from Keene, N. H., to Whitesboro' in 1812. Reginald Foster, who came from Essex County, England, in 1638, was the founder of the family in this country. In his youth Mr. Foster declined to enter upon a collegiate course, preferring to engage in mercantile pursuits. His first engagement was with James Sayre, a Utica hardware merchant. He soon mastered the business and in 1846 embarked in trade for himself at 135 Genesee street. The energy, foresight, application and honorable dealing which he associated with this establishment secured for it a high reputation and for its founder much wealth. For 47 years the business has been conducted at this point, and Mr. Foster was thus the oldest merchant on that street. In recent years his sons, Abbott and David S. Foster, have been associated with him. Mr. Foster's enterprise was not entirely confined to the conduct of his hardware business; he was also prominent in extending Utica's railroad facilities, and the Utica & Black River and the Utica, Chenago & Susquehanna Valley railroads found in him a zealous advocate. He subsequently became a director in these corporations. Mr. Foster was also a director in the Utica City National Bank from its foundation, and was for many years its vice-president.

GEORGE E. HOWARD.

George E. Howard, New York agent of the Clinton Wire Cloth Company at 59 Beekman street, died March 13, between 3 and 4 a.m., at his home in Newark, N. J. The cause of his decease was heart failure. Although he had been ailing some time such a result was unexpected. Mr. Howard was about 40 years of age and had been connected with this interest

for 15 years, the last eight as manager of the New York house. He was born at Shiloh, New Jersey.

### The Tennessee Coal & Iron Management.

Thomas C. Platt offered his resignation recently as president of the Tennessee Coal, Iron & Railroad Company, and it was accepted by the directors on condition that it would not take effect until the annual meeting of the company next month. Mr. Platt decided to retire from the place some time ago, and so informed his friends. Consequently his action yesterday caused little surprise. The reasons that led him to take this action are contained in his letter, which is as follows:

*To the Board of Directors of the Tennessee Coal, Iron & Railroad Company:*

GENTLEMEN.—I hereby tender my resignation as president of your company, to take effect at such time as will best suit your wishes and convenience. I take this action for two reasons: first, the demands upon my time in connection with other enterprises in which I am engaged makes it impossible to devote the care and attention to the business of your company which your great interests require; second, it has been generally understood and expected that when the plan of acquiring the two additional properties, namely, the De Bardeleben Coal & Iron property and the Cahaba Coal Mines, increasing the capital stock from \$10,000,000 to \$21,000,000, was perfected, the Southern interests in this company would be controlling, and that they should be permitted to dictate the policy of the company and manage its affairs. That time has arrived, the combination having been just now completed by the listing last week of the Cahaba stock.

In taking this step I have no intention of disposing of my holdings or abating my interest in the company. I have greater faith now in its future than I ever had before, and believe to-day that it is the greatest coal and iron property in this country or probably in the world, and that with careful and economical management, which I know it will receive at the hands of the new management, it is bound not only to take care of its liabilities, but pay dividends upon its common stock. A company which, during this unprecedented depression in the iron market, has been able not only to take care of its fixed charges and all liabilities, but pay dividends upon its preferred stock and lay up a surplus of about \$400,000 in a year, is well deserving of the confidence of the public.

I desire to congratulate the board upon the perfectly harmonious relations that are at present existing between all its members, and desire to express to every member of the board my appreciation of the uniform courtesy and support which I have received from them during my administration. Respectfully yours,  
T. C. PLATT.

After Mr. Platt's letter had been read, Mr. De Bardeleben offered these resolutions, which were unanimously adopted:

*Resolved*, That this board receives with regret the resignation of the Hon. T. C. Platt as president of the Tennessee Coal, Iron & Railroad Company, and is influenced in accepting the same only because they understand that his other engagements will not permit his longer discharging the duties of the position.

*Resolved*, That the board feels it due, not only to Mr. Platt, but to the board, to place upon record its sense of the eminent and valuable services rendered by him as president of this company, and that these resolutions be spread upon the minutes of the meeting, and a copy be sent to Mr. Platt.

*Resolved*, That Mr. Platt be requested not to press his resignation until the annual meeting of the company on April 4 next, but that he continue to serve the company as president and his resignation be not accepted until that date.

The meeting, which was held at the company's offices, 49 Broadway, was attended by all the members of the board. These are: Mr. Platt, John H. Inman, A. B. Boardman, C. C. Baldwin, James T. Woodward, A. M. Shook, of Nashville; A. T. Smythe, of Charleston; T. T. Hillman, of Birmingham; N. Baxter, Jr., of Nashville; H. F. De Bardeleben, and D. Roberts, of Bessemer, Ala., and the three new members, J. D. Adger, Moses E. Lopez and Walker Percy.

It is understood that Mr. De Bardeleben will be the next president.

A second meeting of the board was held on Tuesday afternoon, and was continued in the evening to a late hour. Even then the questions at issue were not decided, and a further meeting has been held at the Fifth Avenue Hotel.

It is understood that one of the most prolific topics of discussion was the representation of the different interests on the new board of directors. The De Bardeleben interest is now in control and is now believed to be entitled to a larger representation.

To the iron and steel trades at large the most interesting subject being discussed is that of the building of a steel plant. We understand that the Metal Refining Company, who control the Talbot patent, have submitted a proposition which is favorably considered. Time till April 15 has been granted for its acceptance. A report concerning the tests at Birmingham has been submitted by A. M. Shook of Nashville. The proposition of the Metal Refining Company calls for a plant of a minimum capacity of 300 tons of steel per day, and for the erection of a heavy cogging mill.

The new works will probably be located at Bessemer, near Birmingham, Ala., although there is some talk of the building of a second works by other allied interests at the latter city. The Bessemer plant would have the backing of the Bessemer Land Company, a De Bardeleben interest which is reported as having a cash reserve of close upon \$600,000.

The Talbot process seems to solve the one perplexing question which hampered the development of a steel industry based upon the cheap raw material of the Birmingham district and is likely to protect it against a growing and serious danger. The market for forge irons and the lower grades is being rapidly restricted by the development of the soft steel trade and since the percentage of foundry grades in the Birmingham district is relatively low at the majority of plants, the marketing of the other grades promises to become a matter of increasing difficulty. Already the local rolling mills find the competition of Northern steel bars and sheets a very serious matter. Therefore the future of the Birmingham interests rests largely upon the utilization of the forge and lower grades for the manufacture of steel.

The success, technically, of the work at Chattanooga of the Southern Iron Company, proved that steel can be made by the basic process. About 4000 tons of steel billets were made, the quality of which is pronounced excellent by wire works in the North. But the steel was made from charcoal iron, costing about \$12 per ton and from special coke iron, of which about 1600 tons was converted.

The steel maker was forced to face one of two dilemmas in dealing with the ordinary Birmingham metal. When he turned to low silicon pig, the sulphur was too high, while low sulphur iron contained too much silicon to allow of its use in the basic process. Desiliconizing in an acid lined vessel has its very serious drawbacks.

For this perplexing situation the Talbot process promises to afford an outlet. Mr. Talbot desiliconizes the ordinary metal by pouring it through a bath of molten basic cinder. He has found that the cinder obtained from one basic open-hearth charge, using the pig and ore process, is sufficient to lower the silicon contents in the pig for the next charge to make it available for the basic open-hearth process. At the same time there is some reduction of the phosphorus contents and in the carbon. The basic cinder used may contain from 16 to upwards of 30 per cent. of silica, the higher range being limited by the rephosphorization from the cinder. The reaction consists of

a swirling motion of the cinder, which is covered with a layer of spongy cinder, through which are scattered pellets of metal. After the reaction, which lasts about five minutes, a little fluor spar is added to render the cinder liquid and clear.

The desiliconizing is carried out on the hearth of the furnace, the metal being tapped and recharged after the cinder has been removed.

It is proposed to take the metal direct from the blast furnace.

The records of the analyses of the Birmingham tests are not yet at hand, with the exception of the first heat, but small sample ingots from each heat have been tested with satisfactory results. In all twenty heats were made at Birmingham, producing about 80 tons of 16-inch ingots.

The results thus far accomplished with the Talbot process give the greatest encouragement for the successful establishment of a steel industry in the Birmingham district. The significance of such a result for the Southern iron industry need hardly be pointed out. It is likely to have considerable influence upon the interests of other steel-producing sections of this country.

### Washington News.

*(From Our Regular Correspondent.)*

WASHINGTON, D. C., March 14, 1893.

Secretary Herbert has been in conference with his chiefs of bureaus in reference to the details of the administration of his department and the outline of a policy which shall govern his action in the future. The Secretary, as chairman of the Committee on Naval Affairs, took a liberal course toward naval construction, although not quite so advanced or broad as the Senate Committee. The President is favorable to a continuance of the work as rapidly as it can be advantageously forwarded. This will have the effect of preventing any reactionary steps if they should be attempted in the Department. The impression left by the Secretary on the minds of the bureau officers was very favorable. He informed them that he desired to continue the reconstruction by the building of additional ships of the most advanced types, and whatever he could do in an administrative way to further that end should be done.

He will give some attention during the coming summer to familiarize himself with the service at the navy yards and will visit some of the private yards where new ships are being built. This experience will not be new to him, as he has already acquainted himself with these subjects on the ground, but as the head of an executive department he expects to see things in a very different light. At present the Secretary is busy resisting the pressure of office hunters and politicians under the rules laid down by the President and in getting his personal staff organized.

The successor to assistant Secretary Solely will be Wm. McAdoo, an ex Representative from New Jersey. This will be a most excellent selection. Mr. McAdoo was one of the bright young members of Congress. He was at the Navy Department to-day and had a conference with Secretary Herbert. He is a man of liberal views and as a legislator was a friend of the navy.

The late Congress did nothing in the line of additional large ships for the navy. The small vessels authorized will soon be disposed of. The work in the Construction and Engineering bureaus of the Department already feels the effect of this condition of things. In the Ordnance Bureau, however, the whole force is busy on new guns and new discoveries in armament and armor.

## Mesaba News.

The Duluth, Missabe & Northern road, which began its existence last year, and laid 75 miles of rails, expects to put down at least 100 miles this year, and it has just bought of the Illinois Steel Company about 6000 tons of rails. This, with what it has on hand, will lay 55 miles. On the 12 miles of double track at the Duluth end of the road the rails will be 80 pounds; north of that, 60 pounds. The Duluth cut-off, including double track, amounts to 32 miles, and is to be ironed June 1. A 24-mile extension west from the main line to the Lake Superior Mountain Iron No. 3 Mine and Mesaba Chief, will be built later, together with a 10 mile loop, taking in a dozen mines at Missabe Mountain and Virginia, and some 10 miles of sidings. Later, and possibly not until next winter, the company will extend an easterly branch along the East Mesaba and up the Vermilion range into the vicinity of the Chandler group of mines, a territory heretofore exclusively under Duluth & Iron Range road control. In 1894 it will extend northerly toward the Rainy Lake country. On all these extensions, especially the last two, are vast bodies of pine timber, which the road will open to Duluth lumbermen by low rates of freight on logs.

The road's great ore dock at Thirty-third avenue, west, Duluth, is taking shape with greater rapidity than any such structure heretofore. It is expected to be ready in July. The road claims to be assured of a business for 1894 of between 2,000,000 and 2,500,000 tons of ore from the various mines it will then reach.

Fifty-one one hundredths of the \$5,000,000 of stock of the Lake Superior Iron Company, which has four mines in township 57-21, has just been bought by bondholders of the Duluth, Missabe & Northern Road and stockholders of the American Steel Barge Company, whaleback builders, for \$250,000, or about 10 per cent. These purchasers are Colby, Wetmore and others of New York, holders of what are known as the Wisconsin Central Mines on the Gogebic, and the same sales agents at Cleveland will dispose of all these ores, including the Merritt Mines of the Mesaba. This fact has had a good deal to do with a story of a combination of ore producers, though such a combination is under way, including at least the Gogebic, Vermilion and Mesabe ranges.

The Minnesota Company at Tower, Vermilion range, hoisted one day last week 3821 tons of ore, and is averaging a daily output of 2600 tons. The Chandler, of the same company, is hoisting about 3000 tons a day. It will be a very easy matter for these mines to make the record set by them some weeks ago, and published in *The Iron Age* at the time—namely, 600,000 and 700,000 tons respectively for 1893.

A bill is now before the Minnesota Legislature granting a rebate on all ore mined on lands leased from the State and manufactured in the State. The regular State land royalty is 25 cents a ton, while the rebate will bring it down to 5 cents. There is little doubt that it will become a law. Such an act would probably settle the location of all iron and steel manufactures seeking the head of the lakes. Take a blast furnace of 100 tons daily capacity, for example; it would use probably 160 tons of ore daily. Twenty cents a ton rebate would be \$32, or \$11,680 a year. Money being worth 6 per cent., this is equivalent to a bonus of \$195,000, or not far from the first cost of the furnace itself, provided it was in steady operation. Probably half the Mesaba mines are on State-leased lands.

One of the most important properties on the Mesaba range, so far as present developments have gone, is shown to be the Mesaba Chief mine in township 57, range

23, on the west part of the Mesaba ore body. The exact location of this mine is the south half, and the SW.  $\frac{1}{4}$  of the SW.  $\frac{1}{4}$  of section 23, comprising 120 acres, and giving an L-shaped piece of land, 2640 feet on each of its longer sides. There have been sunk into the ore body 12 shafts, 11 of them scattered over the north  $\frac{3}{4}$ s of the property, and none of these has penetrated the deposit. Shaft No. 6, which, with its drill hole in bottom, is the deepest on the property, is down, full size, 66 feet, with a drill sunk 55 feet further. It is evident that the ore body dips to the south and east, for thorough workings immediately to the north and west have disclosed nothing, and the northwesternmost pit on the company's property is in an ore mixed with quartzite. It is now known that the area of the ore deposit is 2500 feet one way by more than 1000 the other, while one pit sunk about in the center of the southerly 40 acres has gone into ore of the same grade and in the identical conditions with the pits in the two 40-acre tracts just north of it, thus giving the impression that ore covers a good part, at least, of this south tract. If such is the case, the area of ore is increased 50 per cent., making this equal to the largest deposit on the Mesaba, as at present opened and explored.

Shaft 6, which is the best developed on the property, and is in the center of the northerly 80 acres, shows a section as follows: From the surface downward, glacial drift, 36 feet; red ore and ochre, 4 feet; blue soft ore, 13 feet; red jasper and paint rock, 7.5 feet; blue and brown soft ore mixed, 7 feet; hard ore, 15 feet; soft blue ore, 52 feet; total, 121 feet, with the drill which has been ahead of the miners for the last part of the depth, bottomed in a ledge of hard ore similar in character to that 52 feet higher. So far as prosecuted all other shafts show this same character.

Six average assays of the upper layer of blue soft ore are as follows:

	Iron.	Silica.	Phosphorus.
1.....	60.40	10.91	0.017
2.....	58.90	10.91	0.023
3.....	57.20	12.72	0.017
4.....	56.30	11.22	0.043
5.....	61.40	.....	0.020
6.....	58.84	11.14	0.019

The streak of paint rock, 7.5 feet thick, analyzes about 52 iron, not valuable enough to ship long distances, but of sufficient importance to figure as merchantable ore whenever furnaces are put in at Duluth to handle these grades. The mixed soft ore and the thin layer of hard ore run about 60 in iron, while the larger body of soft blue ore in the lower half of the shaft varies from 60 to 63.50 iron and is fully as low in phosphorus as any other level.

There is a drift covering the ore varying in thickness from 18 to 36 feet, but averaging a little over 20 feet. Though it is far less than the covering of several Mesaba mines that are being operated by the stripping process, this property will be mined underground and backstopped. There are now at the mine 2 50 horse power boilers, 2 No. 7 Crawford and 3 No. 8 Cameron pumps, and one 2-ton hoist. It is expected to ship some ore this year, and the Duluth, Mississippi & Northern road will deliver the ore at dock at 80 cents. It is probable that the Duluth, Missabe & Northern, which is now surveying toward the mine, will ultimately handle its ore, and at a much lower figure than 80 cents, the haul to its Duluth docks being fully 25 miles less than over the other road to the Duluth and Winnipeg docks on the Superior side of the bay, with which the Mississippi & Northern connects.

Estimating 11.9 cubic feet of ore to the ton, there are in sight at this mine about 14,000,000 tons of ore, nearly if not quite all of a Bessemer grade, while the proba-

bilities are that this sizable quantity in sight will be 50 or more per cent. increased by later and more thorough work.

## MANUFACTURING.

## Iron and Steel.

Riter & Conley of Pittsburgh have received a contract from the Roane Iron Company of Rockwood, Tenn., for the erection of six hot-blast stoves of the Hugh Kennedy design, which were illustrated in a recent issue of *The Iron Age*. The Roane Iron Company will soon commence the erection of a new furnace, 17 x 75 feet, immediately adjoining the present stack, and when it is completed the old stack will be torn down and a new one erected in its stead. Three of the above stoves will be put in the new furnace and the other three will be put in the second furnace, which will be built upon completion of the first one.

Rogers, Brown & Co. have secured the exclusive agency for the output of the Watts Steel & Iron Syndicate, Limited, of Middlesborough, Ky. The Watts Syndicate are making all grades of coke iron, foundry, soft and forge, and are also to make steel billets from Southern iron by the basic process. The pig iron output of the Watts furnaces for the market is about 150 tons a day.

Furnace A of the Edgar Thomson plant at Bessemer, Pa., which has been idle for several months undergoing extensive repairs, resumed blast last week.

At the Albany Iron Works, Troy, N. Y., last week, the 14 and 18 inch trains, the axle hammer and the puddlers were in operation. They will continue to run, provided there is plenty of water. The outlook for this is not very favorable.

Work at the Rensselaer Iron Works, Troy, N. Y., has been delayed by the breaking down of the engine, which occurred March 6.

The Utica, N. Y., Merchants' and Manufacturers' Exchange have received a proposition from a rolling mill, running at present on a capital of \$200,000, to locate at that city. This concern will go to Utica and employ 600 men if the city will present them with a site and take stock to increase the capital to \$300,000. The matter is under consideration by a special committee.

The large Cumberland Furnace at Clarks-ville, Tenn., will go into blast in a few days. A large supply of ore has been put in and everything is in readiness to commence work.

It is stated that an effort is being made by several of the gentlemen interested in the foundries and rolling mills at Knoxville, Tenn., to combine for the purpose of operating an extensive iron foundry for the manufacture of water and gas pipes, iron columns and structural iron work of all descriptions. It is stated that the iron plants at that point are not making money, and it is thought a combination of the interests would be beneficial.

Col. R. H. Logan, special judge in the case of the Crozer Iron Company, Pocahontas Coal Company and others against the Roanoke Rolling Mill Company of Roanoke, Va., has filed his opinion, and orders that unless the rolling mill company can pay the various claims, amounting to about \$75,000, within 30 days, the property shall be sold by the receivers. An appeal has been taken.

The Ohio capitalists who purchased the Victoria Furnace at Goshen, Va., and organized the Virginia Iron & Railway Company, are making preparations to put the plant in operation this spring. Several new ore deposits will be developed on an extensive scale.

The purchase by an English syndicate of a large body of land, east of Bristol, Tenn., which is reported in the daily papers, is given little credence, although it is now stated that they propose to erect a large furnace, and that an effort will be made to secure the Bristol Furnace, which is now idle.

That portion of the plant of Wallace, Banfield & Co., Limited, manufacturers of tin andterne plate, and operating the Irondale Rolling Mill, at Irondale, Ohio, which was destroyed by fire in December of last year, has been rebuilt. A new iron building, 90 feet wide by 160 feet long and 22 feet in height, has been erected, and also an annex 30 x 160 feet in size. This main building contains the tin-plate rolling mill, cold rolls, engines, boilers and shears. The building was erected by Riter & Conley of Pittsburgh, the engines being furnished by Mackintosh, Hemphill & Co., Limited, of that city, while the vertical trimming shears were furnished by the Lloyd Booth Company of Youngstown, Ohio, and the doubling shears by the Leechburg Foundry & Machine Company of Pittsburgh. This concern turn out tin andterne plates, and in addition market a larg



part of their product in the shape of black sheets, of which they have a daily capacity of 30 tons. Their main office is located at the corner of Third avenue and Wood street, Pittsburgh.

The Moline Malleable Iron Company, of which William B. Ullmann is president, are reported to have decided to remove to St. Charles, Ill. Their plant at Moline was recently destroyed by fire. St. Charles is developing into prominence as a manufacturing center.

The new officers of the Joliet Sheet Rolling Mill Company of Joliet, Ill., are M. Calmer, president and general manager, and F. W. Werner, secretary. Arrangements for starting the works have been perfected and the mill will be in operation in a few days.

General J. T. Wilder, manager of the Carnegie Furnace, at Johnson City, Tenn., states that the furnace will blow in May 1. Arrangements have been completed for their coal and coke supply.

It is reported that the work of repairing the Cowan Furnace at Tracy City, Tenn., is progressing very slowly, and that it will probably not blow in before the middle of summer.

On the night of January 31, 1893, Austin Bros. & Porters' foundry and machine shop buildings were entirely destroyed by fire, and it was immediately officially announced that the firm would not rebuild. Since then, however, A. G. Morris, one of the wealthiest, most enterprising and progressive men in Central Pennsylvania, bought the grounds, foundations, &c., and will immediately commence the erection of a large foundry, machine shop, pattern shop, pattern storage room and office. The buildings will be brick and be made fire-proof throughout.

The old Cameron blast furnace, at Middletown, Pa., is being dismantled by Jos. McClure & Son of Philadelphia, the purchasers.

The Thomas Iron Company of Hokendauqua have announced a reduction of 10 per cent. in wages, to take effect April 1.

The Tonawanda Iron & Steel Company of Tonawanda, N. Y., have increased their capital stock from \$250,000 to \$500,000.

The new steel foundry of the General Electric Company, at Lynn, Mass., has been put into operation.

It is reported that the Deborah and Isabella furnaces, coke and charcoal respectively, owned and operated by the Catocin Mountain Iron Company, in Frederick County, Md., have been sold to a syndicate of New York capitalists, represented by W. B. Price of Baltimore. The property was purchased by the present owners three years ago, the price being, it is said, between \$75,000 and \$80,000, which was considered a very low price. It is understood that efforts have been made to sell the property for some time.

Mary Pratt Furnace, at Birmingham, Ala., has been sold at public auction to W. T. Underwood, the principal stockholder, for \$100,000. The purchaser assumed a bonded debt of \$57,000. The furnace has been in litigation and idle for three years.

A new plate mill roll has been received at the Valley Mill in Youngstown, to replace the broken one, and was placed in position, so that this department will resume operations. The replacing of this roll, which weighs nearly 6 tons, is the quickest on record. It was cast in Pittsburgh last Monday by A. Garrison & Co. That night Robert E. Daniels went to Pittsburgh, interviewed General Freight Agent Dean of the P. & L. E. R.R., and Tuesday night it was placed on a car, reaching Youngstown Wednesday morning at 1.30. The roll turning was finished Friday, and Saturday it was in readiness for service.

It is expected that the new sheet and tin mills of the Falcon Iron & Nail Company, at Niles, Ohio, will be completed so that the fires can be lighted the first week in April. The plant will be one of the finest in the country.

The proposed removal of the Reeves Iron Works from Niles to Alliance, Ohio, will aid the latter and prove a serious injury to the industrial future of the former. Since it was established the concern has run very steadily, giving employment to a large number of skilled workmen who, with their families, will remove to Alliance.

The rolling mill of the Union Iron & Steel Company, at Warren, Ohio, was flooded out by the river rising and water backing up Friday, compelling a suspension of operations.

The stockholders of the Ohio Iron & Steel Company held their annual meeting Friday and elected the following board of directors: Messrs. Thomas H. Wells, John C. Wick,

Myron C. Wick, Fred. H. Wick, T. F. Woodman, Samuel Mather and Robert Bentley. Owing to the absence of a quorum the directors postponed their organization.

#### Machinery.

Work is progressing on the new shops now being erected by the Frank-Kneeland Machine Company of Pittsburgh. Building operations have been seriously impeded by the excessive cold weather; but work on the buildings will be actively pushed from this time forward, and the concern expect to be in the market with rolls and rolling-mill machinery within the next 30 days. I. W. Frank, chairman of the concern, was with the Lewis Foundry & Machine Company of Pittsburgh for many years, and is well known to the trade.

Robert Poultny, expert pattern maker, formerly in the employ of Wm. Tod & Co. of Youngstown, Ohio, has leased the buildings formerly occupied by the Youngstown Stove Company of that city, and will embark in the foundry and machine business. Mr. Poultny has patents covering a valve and other mechanical devices which he proposes to manufacture.

The Common Sense Engine Company, Muncie, Ind., find it necessary to increase their productive capacity on account of the rapidly increasing demand made upon them for engines.

The Shillenback Machine Tool Company, Richmond, Ind., report a very satisfactory trade in their specialties, and will increase their present facilities as soon as practicable.

It is stated that the shops for the Chattanooga division of the Central Railroad are to be located at Cedartown, Ga. Buildings will be erected and equipped with latest improved machinery.

Extensive repair shops are to be erected at Fort Smith, Ark., by the Kansas City, Pittsburgh & Gulf Railroad.

McGahey Bros., Elkton, Va., are preparing to erect a large foundry in connection with their machine shops.

The Tubbs Engine Company will erect an extensive plant at Knoxville, Tenn., for the manufacture of an improved engine.

The Berlin Iron Bridge Company of East Berlin, Conn., have secured the contract for the new buildings required by Wm. Cramp & Sons' Ship & Engine Building Company of Philadelphia, Penn. The Berlin Bridge Company have lately completed a boiler shop for the Cramps, and now have a contract for all the other buildings required to enlarge their plant. The new buildings will consist of a ship shed, 60 x 100 feet; a black board, 75 x 200 feet, and a bending shed, 86 x 150 feet, constructed throughout of iron.

The new J. A. Fay & Egan Company of Cincinnati, Ohio, propose designating each plant formerly occupied by the old concerns as the Fay department and as the Egan department, and both will be run by the same foremen and workmen as in the past. Each department will continue to construct machinery from the same patterns and precisely of the same type, but with improvements which will be added from time to time.

The Campbell & Zell Company of Baltimore, Md., have just completed a 250-horse-power Zell boiler for the Chino Valley Beet Sugar Company of Chino, Cal., as an addition to the 1250-horse-power plant which they supplied to them about two years ago. They have also in course of construction a 2000-horse-power plant for the Baltimore City Passenger Railway Company, who are building a cable road, and a 100-horse-power plant for Max Mayenberg of Hoboken.

The Pennsylvania Diamond Drill & Manufacturing Company of Birdsboro, Pa., have contracted to build for the Globe Gas Engine Company of Philadelphia 36 gas engines, ranging from 1 to 15 horse-power.

The Schenectady, N. Y., locomotive works have just completed nine new engines for the iron ore trade on the Duluth & Iron Range Railroad. They are the largest ever turned out from these works. The engines are of the 12-wheel type, having eight drivers coupled with a four-wheel leading truck. The cylinders are 22 inches in diameter and have a 29-inch stroke. The driving wheels are 54 inches in diameter. The boilers are designed for a working pressure of 180 pounds to the square inch. The total weight of engine and tender is 236,000 pounds.

The company recently organized at North Tonawanda, N. Y., to manufacture Spang blowers have elected the following directors: George A. Spang, James Armitage, Ansel P. Austin, John O. Ball, James S. Tompkins, Albert Spillman and Edward G. Riesterer. The company will be known as the Electric City Machine Company. A brick factory 40 x 80 feet and two stories high will be erected

at once. The company already have a large number of orders to fill.

Work on the plant at Oswego, N. Y., to be occupied by the Tonkin Boiler & Engine Company, is progressing rapidly. It is expected that the factory will be ready to begin work by June 1.

The Aultman & Taylor Mfg. Company of Mansfield, Ohio, have completed arrangements for an addition to their boiler works, which will materially increase their capacity for turning out both boilers and engines. The addition will be 260 x 100 feet, so that when completed the main structure will measure 325 x 100 feet.

The Lannon foundry at Pueblo, Col., has been burned, entailing a loss of \$65,000, partly insured.

The Philadelphia Car Wheel Company, recently organized, have commenced business at Philadelphia. The work carried on at present is mostly that of finishing wheels for the street car companies. As soon as the business grows sufficiently the company will begin the casting of wheels.

The F. W. Foster Mfg. Company have been organized at Portland, Me., for the purpose of manufacturing faucets, automatic sprinklers and apparatus used by steam fitters, with \$250,000 capital stock.

The Bates Machine Company of Joliet, Ill., have increased their capital stock from \$20,000 to \$100,000 with a view to securing increased facilities.

The Andrews Wire Works, at Rockford, Ill., recently burned, will be rebuilt on a larger scale. A new company, capitalized at \$20,000, is to be formed.

The United States Bronze Company of Cleveland, with a capital of \$100,000, were granted a charter last week. The new concern propose to deal in and manufacture brass and bronze castings and ingot metals. The incorporators are C. L. V. Evans, M. H. Farnsworth, W. C. Beckwith, Jno. H. Shephard and W. A. Price.

The Lebanon Foundry & Machine Company of Lebanon, Pa., have been granted a charter, with a capital stock of \$70,000, and will engage in the manufacture of boilers, engines and other lines of machinery.

The blacksmith shop and foundry of the Laconia Car Works, Laconia, N. H., have been burned, at a loss of \$25,000. They will be rebuilt at once.

An extension 60 x 75 feet will be built to the foundry of the Huber Mfg. Company at Marion, Ohio. A new boiler shop will be built in the fall.

#### Miscellaneous.

Construction has been commenced on a four-story and basement factory, 42 by 160 feet, for the Breitling Metalware Mfg. Company at the northeast corner of Huron and Sedgwick streets, Chicago. The exterior will be of pressed brick and stone, while the interior will be of mill construction, and will be supplied with elevators. The cost is placed at \$30,000.

C. W. Hunnicut, A. S. Seals and associates have applied for a charter for the Georgia Stove Works, with a capital of \$50,000, and a plant will be erected at Atlanta, Ga.

Morrison's brass foundry at Mimico, Ont., has been burned. Loss, \$40,000; insurance, \$15,000.

The plants of the United States Rolling Stock Company, located at Anniston and Decatur, Ala., were sold in Anniston at receiver's sale on the 9th inst. The only bidder was George W. Ristine, agent of a company reorganized out of the old one under the name of the United States Car Company. Mr. Ristine bid in the property for \$150,000, subject to a blanket mortgage of \$1,300,000, which covers both plants in Alabama, also the one at Urbana, Ohio, and the other at Hegevisch, Ill. The latter have not been sold, and until that is done the proportion of the common mortgage to be assumed by the Alabama plants cannot be assessed. Mr. Ristine says he hopes to have both the plants he purchased running in a short time. Together they employ nearly 2000 men.

The Berlin Bridge Company have just completed a power station 38 feet wide by 112 feet long, for the Roaring Fork Electric Light & Power Company, at Aspen, Colo.

An Allentown, Pa., dispatch says that the Rancocas Iron Company of Hainesport, N. J., largely engaged in the manufacture of plumbers' supplies and kindred goods, are about to remove to that city. A large plant is now in course of erection.

The Novelty Stamping Works of Bellaire, Ohio, have been equipped with new machinery and will shortly be started up with a full force of men.

The handle factory of Allen Bros., at Huntington, Ind., has been sold to Witherington & Cooley of Jackson, Mich. The new owners will enlarge the present works.

# TRADE REPORT.

Rumors that negotiations in Lake Ore are coming to a point are numerous, but as yet nothing has been done. Some of the leading Pittsburgh interests are reported to have made low offers, while the Ore mines are standing out for \$4 for Soft Bessemer. The conviction is gaining ground that the price will settle down to about \$3.85, Cleveland, for Gogebic Bessemer. If the consumption of Soft Steel continues to increase as rapidly as it has done lately, the quantity of Bessemer Lake Ore and of Bessemer Pig which will be required will be very much larger than it was last year.

Reports concerning Pig Iron are somewhat conflicting. Philadelphia reports a steady market, while New York notes an improvement in the demand. St. Louis records a state of affairs bordering on demoralization, while Cincinnati notes a market of moderate activity, but of weakening tendency. Local furnacemen seem to have withdrawn in Chicago, leaving Southern sellers to a sharp contest for what business is available.

The scarcity of spot Soft Steel and the advance in the price of Billets in the Pittsburgh, Wheeling and Shenango districts show that the converting capacity is again fully taxed. There is one point which seems to promise that this may continue for some time to come. Those of the Rail mills which have diverted converting capacity into the Soft-Steel trade are likely to be kept busy rolling Steel Rails to meet the renewal demand in spring and early summer.

A further strengthening in Soft Steel may be expected to have its effect on finished material in many lines. In the Wire and allied trades, notably in Nails and Barbed Wire, the demand has been very heavy and has been to some extent reflected in higher prices. In Bars, Shapes and other articles of which the Bessemer Billet is the foundation, values may be expected to harden until the puddling mills and the works rolling from old material cause a check. It may be doubted, however, whether these finished articles which start with Open Hearth stock will closely follow the leadership of the Bessemer mills.

If the Steel Rail trade gave any promise of good activity during the current year, the enormous volume of business in other lines would probably create a rapid rise. But there is no prospect that relief will come from that quarter.

No exceptionally large transactions are recorded from any quarter. The Alton Bridge has been taken and a number of good car orders have been placed. A good deal of Cast Iron Pipe is also on the market. The Structural and Plate mills seem to be very busy in the Pittsburgh district, but in the East the works which roll Shapes are still hungry for business, which, however, promises to come out more liberally a little later on.

In the face of higher quotations in London, our Tin market has declined about 1¢ per pound during the week. Lead is dull and apparently firm. Coke Tin Plates are slightly higher, while Terns are easier.

## Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, March 15, 1893.

The threatened strike of all the switchmen on the railroads here has been postponed. A conference was held Monday between railroad managers and representatives of switchmen, at which the latter withdrew their demands and stated they would not press them until some time in future when railroad earnings were improved and the demand for higher wages would seem more reasonable. All classes of business men hope that this menace to Chicago business has been removed. The delivery of freight is still retarded by other inconveniences and the event of good weather, which was expected to improve the situation, has as yet made very little difference. Complaints are very numerous over the non-arrival of freight from Eastern points, which has been on the way for a month or more. Inadequate motive power, scarcity of cars and the very heavy movement of freight are the principal reasons assigned for the trouble.

**Pig Iron.**—The demand for local Coke Iron fell off considerably during last week and the general Pig Iron trade has therefore been comparatively quiet. The price on No. 1 Local Coke has for some time been relatively low as compared with other grades, resulting in very heavy business, which led to such scarcity that manufacturers have found it expedient to advance prices about 50¢ per ton. Quotations are revised accordingly. Southern Coke Iron has sold a little more freely, but not in sufficient quantity to make trade active. Competition among sellers of Southern Irons is very keen and all transactions are still being made at cut prices. No. 2 Foundry and No. 1 Soft are known to have been sold at least 25¢ below our quotations. Lake Superior Charcoal remains quiet but steady at old rates. We revise our quotations as follows, cash, f.o.b. Chicago:

Lake Superior Charcoal.....	\$16.50 @	\$17.00
Local Coke Foundry, No. 1.....	13.75 @	14.25
Local Coke Foundry, No. 2.....	13.00 @	13.25
Local Coke Foundry, No. 3.....	12.75 @	13.00
Local Scotch.....	14.00 @	15.00
Ohio Strong Softeners.....	16.00 @	16.50
Southern Coke, No. 2.....	13.25 @	13.50
Southern Coke, No. 3.....	12.75 @	13.00
Southern, No. 1, Soft.....	13.25 @	13.50
Southern, No. 2, Soft.....	12.75 @	13.00
Southern Gray Forge.....	12.60 @	12.90
Southern Mottled.....	12.50 @	12.75
Tennessee Charcoal, No. 1.....	16.50 @	17.50
Alabama Car Wheel.....	18.35 @	19.85
Coke Bessemer.....	14.50 @	15.00
Hocking Valley, No. 1.....	16.75 @	17.00
Jackson County Silvery.....	16.75 @	17.00

**Bars.**—The situation with regard to Bar Iron is not so bad as has been reported for the past two weeks. Some of the mills have evidently been running short of orders and the market has weakened. The highest price now realized in moderate orders for mill shipment is about 1.55¢ half extras, Chicago. It is reported that lower figures are being made by some of the manufacturers most eager for new business. Some large transactions have recently been closed covering deliveries running into the summer, and it is stated that competition for these orders led to the lowering of values. Generally speaking, the manufacturers are quite well supplied with business, especially those who have not been aiming to realize the top notch of prices recently current. The outlook from their standpoint is sufficiently encouraging to make them believe better prices will again prevail at an early day. Jobbers are realizing a very fair demand from stock and latterly have been making shipments of a character usually sent to the mill, but consumers were too urgent in their necessities to wait for deliveries. Soft Steel Bars are steady at 1.65¢,

Chicago, and upward, with very good inquiries. Store prices range from 1.70¢ @ 1.80¢ for Bar Iron and 1.75¢ @ 1.85¢ for Soft Steel Bars.

**Structural Material.**—A good business is being done in small lots of Beams and other structural material for quick shipment. Large transactions are still delayed, but indications are in favor of quite a number of them being closed up very shortly. The new building ordinance passed by the City Council restricting the height of buildings had the effect of bringing out quite a number of new building projects, for which permits were asked before the ordinance went into effect. These projects, which are all likely to materialize, add very considerably to the anticipated demand for Beams this year. Quotations on mill orders, Chicago delivery, continue as follows: Beams, 2¢ @ 2.10¢; Angles and Universal Plates, 1.85¢ @ 1.95¢.

**Plates.**—Only small lots are in the market, but competition continues to be as vigorous as ever among the mills selling in this territory. Quotations on mill shipment, Chicago delivery, are as follows, for carload lots: Tank Steel, 1.85¢ @ \$1.95¢; Shell Steel, 2.10¢ @ 2.15¢; Flange Steel, 2.25¢ @ 2.30¢; Ordinary Fire Box, 3.50¢. Store prices continue as follows: Nos. 10 to 14 Iron or Steel Sheets, 2.35¢ @ 2.60¢; Tank Steel, 2.25¢ @ 2.40¢; Shell, 2.40¢ @ 2.60¢; Flange Steel, 2.70¢ @ 2.90¢.

**Sheets.**—Heavy sales of Light Sheets for summer delivery were made to jobbers the past week at prices reported to be the lowest ever realized in this market. Carload prices are, however, unchanged at 2.85¢ @ 2.90¢, Chicago, for No. 27 Common Black. Sheet Steel is still quoted at 10¢ @ 15¢ per 100 above the price of iron. Galvanized Iron is in demand in small lots only, but buyers are urging quick deliveries whenever they place orders. Prices for mill shipment are still 70 and 10 % discount on Juniata and 70 and 5 % for small lots from stock. Sheet Copper is firm at 30 % off from stock, with some manufacturers refusing further orders for light sheets.

**Merchant Steel.**—Indications grow stronger that season contracts will be placed earlier than usual this year. Consumers are already feeling the market to some extent, and while few of them may be ready to close before April, there will very probably be a good movement in that month. Best makers continue to quote Open Hearth Machinery and Spring Steel at 2¢ @ 2.20¢, Chicago, for mill shipment and Bessemer Tire at 1.67½¢, with Bar Iron extras. Ordinary Tool Steel is steady at 6¢ @ 7¢, according to quality, and specials at 12¢ and upward.

**Billets.**—Quotations are unchanged at \$25, Chicago, for March and April delivery.

**Rails and Track Supplies.**—Manufacturers report only a moderate business the past week in Steel Rails, which are firmly held at \$30 @ \$32, according to quantity. Iron and Steel Splice Bars are unchanged at 1.65¢ @ 1.70¢. Track Bolts with Hexagon Nuts 2.60¢ @ 2.65¢; Spikes, 2¢ @ 2.10¢.

**Old Rails and Car Wheels.**—A leading consumer here is reported to have purchased some Old Railroad Iron Rails at \$18.50. A sale of 1000 tons of long lengths Old Steel Rails is also reported at \$15.25. Short pieces are quoted at \$11.25 here on a parity with Pittsburgh quotations. Sales of Old Car Wheels have been made at \$14.75 @ \$15.

**Scrap.**—Trade is only moderate in Wrought Scrap and prices show a downward tendency. The rolling mills are using cheap Scrap in preference to high-grade Wrought, causing a much better demand for the former. Cast Scrap is moving quite freely, but con-



sumers are endeavoring to force prices lower. Dealers quote as follows per net ton: No. 1 Forge, \$15; No. 1 Mill, \$11; Sheet Iron, \$6; Pipes and Flues, \$10; Axles, \$20; Horseshoes, \$15.50; Fish Plates, \$16.50; Spikes and Bolts, \$14.50; Cast Borings, \$5.50; Wrought Turnings, \$8; Axle Turnings, \$9.50; Heavy Cast, \$11.25; Stove Plate, \$8.50 @ \$9; Malleable Cast \$9; Mixed Steel, \$10 @ \$10.50, gross ton; Leaf Steel, \$17.75.

**Metals.**—Carload lots of Lake Copper are now quoted at 12½¢, while casting brands remain unchanged at 11½¢. Small lots sell at 12½¢ and 11½¢ respectively. Carload lots of Pig Lead have been sold to a limited extent at 3 70¢ @ 3.72½¢, but holders are asking 3.75¢. Spelter in carload lots is quiet at 4.05¢.

## Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Pa., March 15, 1893.

The market for the first time during the past several weeks has shown uniform steadiness. In no case can any special weakness be noted, while in some prices are a shade better, and in all others steady to firm. There is nothing to cause any buoyant feeling, but it is something to note that there is less depression, and at least a semblance of improvement. Whether this will be carried any further or not is for the future to determine. The starting point of the improvement appears to have been in Bessemer Pig, from that to Steel Billets, and so on to material in its more advanced condition.

The trade are now waiting to see what the next move will be, more especially in Ores, Pig Metal and Billets. The next movement in these will probably decide the course of the general market for some time to come. Finished Material is already too low compared with the price of Billets, and, as these are developing increased strength, manufacturers of Plates, Shapes, &c., will be compelled to stiffen their prices in proportion. The question in the meanwhile is whether the movement is genuine, or whether it is a little spurt.

The true inwardness of the thing will have to be developed naturally. There is no such thing as speculation these days. What a consumer needs will be bought, what is not needed (in a speculative sense) will not be bought. Hence all will depend upon the actual relation of supply and demand. Judging from the course of events during the past couple of weeks, it may be assumed that a further moderate improvement is not improbable, and in any case there is very little prospect of a relapse to the low figures quoted a month or six weeks ago. Meanwhile, as we said before, consumers are in no mood to buy very far in advance of requirements, although in some instances prices are quoted lower on that class of business than for deliveries within 30 to 60 days.

**Pig Iron.**—The market, without being strong, is firm and steady. The best brands are well taken up, and at the moment there is not the slightest appearance of weakness in any direction, although makers are not bold enough to hint at even a trifling advance. There is the usual talk about Southern Irons at low figures, but there is no particular pressure for ordinary sized lots, and as far as we can find, quotations are pretty well adhered to. In the event of a round lot of several thousand tons a buyer would require special inducements, but the offerings of this kind are either very few, or they are closely guarded, as we hear of nothing at less than \$12.50, Philadelphia, and in some cases consumers find it difficult to secure anything worth while even at that figure. Taking the market as a whole, it may be said to be steady at unchanged prices, with a good demand, and also a pretty

good supply—one about balancing the other.

The increase in the output, as shown by the last monthly statement, is at the rate of about 5000 tons per week, which for the time being, may have a tendency to check any upward movement in prices.

Sales usually at prices about as follows for Philadelphia and equivalent deliveries, with 25¢ to 50¢ less on Southern brands at Harrisburg and intermediately to Baltimore:

American Scotch, No. 1X.....	\$17.00	@	\$17.25
American Scotch, No. 2X.....	16.00	@	16.25
Standard Penna. (Lake Ore), No. 1X.....	14.75	@	15.25
Standard Penna. (Lake Ore), No. 2X.....	14.25	@	14.50
Standard Virginia, No. 1X.....	14.75	@	15.00
Standard Virginia, No. 2X.....	14.00	@	14.25
Virginia and Southern, No. 1X.....	14.00	@	14.50
Virginia and Southern, No. 2X.....	13.25	@	13.50
Standard Penna. and Virginia Forge.....	13.00	@	13.25
Ordinary Forge.....	12.50	@	12.75

**Bessemer and Low Phosphorus Pig.**—The market is inactive, but prices are steady with a few sales at from \$16 @ \$16.25, delivered, for Standard Bessemer, \$15.50 for Cornwall Bessemer, and \$17.50 @ \$18 for Low Phosphorus.

**Steel Billets.**—The market is dull but prices are strong. March and April shipments from the West to nearby points are quoted at \$24.25 @ \$24.50, and Eastern at \$25 @ \$25.25. Consumers dislike to pay an advance such as these figures indicate, and are therefore either taking small lots to tide them over, or postpone doing anything until they can take a better view of the situation. Prices of the product are lower than they were in January, and paying a dollar or more advance on Billets is not at all in accordance with consumers' ideas. Either they must get more for their product or pay less for their material, and they are not sure which it will have to be. It may be noted, however, that makers quote lower on long deliveries than on short dates, and to that extent consumers have the market in their favor, but sometimes this is misleading, as, for instance, during the summer and fall months of last year.

**Steel Rails.**—Market very quiet, sales mostly in small and medium-sized lots at unchanged prices, \$29 f.o.b. cars' mills.

**Muck Bars** extremely dull. The only sale reported is one of 1000 tons at \$22.50, f.o.b. cars at makers' mills, equivalent to something less than \$23.50, Philadelphia.

**Bars.**—Not much improvement to note in this department except that there is a little more business. Prices are as low as ever, 1 62½¢ @ 1.65¢ for best city Iron, and 1.55¢ @ 1.60¢ f.o.b. cars at mills in the interior, and possibly better than that when the order is extra attractive. Steel is quoted from the same price as iron up to a tenth to two-tenths more, according to requirements, as to tests, &c.

**Skelp.**—Several good-sized lots have been taken during the past few days, but prices are at the lowest—say 1.52½¢, delivered, with no immediate prospect of improvement.

**Plates.**—There is a more active demand from the general trade, and manufacturers are showing a disposition to stand out for better prices. Anything specially attractive as regards quantity, delivery and sizes, would probably be taken at last week's prices, but for ordinary sized lots about a half-tenth more is asked. Mills are now running moderately full, and the indications appear to be favorable for continued activity, and possibly somewhat better prices. Meanwhile general quotations are about as follows (delivered):

	Iron.		Steel.
Tank Plates.....	1.80 @ 1.85¢	1.80	@ 1.85¢
Shell.....	2.00	2.10¢	@ 2.10¢
Flange.....	2.70 @ 2.90¢	2.25	@ 2.40¢
Fire Box.....	3.00 @ 4.00¢	2.50	@ 2.70¢
Special qualities.....	3.25	3.75¢	

**Structural Material.**—There is no decided change in the situation, and with prices still at the lowest, and competition so sharp, there is not much prospect for early relief. Mills have a great deal of work in hand, and with expectations of continued accessions, prices ought to improve, but they do not. Bids are asked for on material for the North Eastern Elevated of this city, which will probably be closed this week, although deliveries may not be required for some time to come. General quotations are about as follows (delivered), but on special orders special figures would probably be made: Beams, Channels or Tees, 2¢ @ 2.20¢, according to size of order; Angles, 1.80¢ @ 1.85¢; Universal Plates, 1.80¢ @ 1.90¢

**Sheets.**—The demand is fair, but prices are extremely demoralized, so much so that it is impossible to give exact quotations on much of the stuff that is offered. The best makes maintain their prices, which for small lots are about as follows—viz.:

Best Refined, Nos. 14 to 20.....	2.75¢ @ 2.85¢
Best Refined, Nos. 21 to 24.....	2.90¢ @ 3.00¢
Best Refined, Nos. 25 to 26.....	3.15¢ @ 3.20¢
Best Refined, No. 27.....	3.30¢ @ 3.40¢
Best Refined, No. 28.....	3.40¢ @ 3.50¢

Common, ½¢ less than the above.

Quotations given as follows are for the best Open-Hearth Steel, ordinary Bessemer being about ½¢ lower than are here named:

Best Soft Steel, Nos. 14 to 16.....	2½¢ @ 2½¢
Best Soft Steel, Nos. 18 to 20.....	3¢ @ 3½¢
Best Soft Steel, Nos. 21 to 24.....	3½¢ @ 3½¢
Best Soft Steel, Nos. 25 to 26.....	3½¢ @ 3½¢
Best Soft Steel, Nos. 27 to 28.....	3½¢ @ 4¢

Best Bloom Sheets, ½¢ extra over the above prices.

Best Bloom, Galvanized, discount.... 70 and 5 % @ 70 and 10 %

**Old Material.**—Dull and heavy, and under pressure to realize; would have to be shaded considerably. General asking prices, with small sales, are at figures about as follows: Old Iron Rails, \$18 @ \$18.50, delivered; Old Street Rails, \$19 @ \$19.50; Old Steel Rails, \$15 @ \$16; No. 1 Railroad Scrap, \$15.50 @ \$16, Philadelphia, or for deliveries at mills in the interior, \$16 @ \$16.50, according to distance and quality; \$8 @ \$9 for clean new No. 2 Light Scrap; \$7 @ \$7.50 for old No. 2 Light Scrap; \$11.50 @ \$12 for Machinery Scrap; \$11.75 @ \$12.25 for Wrought Turnings; \$8 for Cast Borings, and nominally \$22 for Old Fish Plates, and \$13 @ \$14 for Old Car Wheels.

**Wrought-Iron Pipe.**—There is no general improvement and discounts vary from the following to 5 % and 10 % additional, and even more in special cases: Butt, Black, 57½ %; Butt, Galvanized, 50 %; Lap, Black, 67½ %; Lap, Galvanized, 57½ %; Boiler Tubes, 67½ %, all sizes, new list; Casing, 62½ %, new list.

## Louisville.

LOUISVILLE, March 13, 1893

Quite a large amount of Iron has been sold, parties feeling disposed to purchase for long deliveries on basis of present prices. Iron has never been sold on lower basis, and there is certainly no risk on the part of consumers in closing for one's requirements. Work among car companies continues heavy; pipe shops also report more than usual work, and rolling mill companies are working on full time. They report prices for finished material, though, as low as they have ever made. Car-Wheel Irons remain unchanged and sales moderate. The L. & N. Railroad purchased 1500 freight cars, the order being placed with the Mt. Vernon, Gadsden and Anniston car companies. We quote for cash, f.o.b. cars Louisville:

Southern Coke, No. 1 Foundry...	\$13.00	@	\$13.25
Southern Coke, No. 2 Foundry...	12.00	@	12.25
Southern Coke, No. 3 Foundry...	11.00	@	11.25
Southern Coke, Gray Forge...	10.75	@	11.00
Southern Charcoal, No. 1 Foundry...	15.00	@	16.00
Southern Car Wheel.....	17.50	@	17.75

## Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts.,  
CINCINNATI, March 15, 1899.

There has been a moderate volume of business in Pig Iron during the week, and the tone of the market is anything but strong. There is no quotable change in prices, but rumors of concessions having been made are numerous, and when sifted down it appears that it was by some furnaces which are so situated that they have the advantage of a lower freight rate than that from Birmingham. There are abundant offerings of Iron for almost any delivery this year, but buyers seem to prefer to buy only for short delivery, say three or four months ahead, thinking that any probable change in the market will be in their favor. The last sales during the week were 2000 tons, 500 tons per month for four months and 3000 tons deliverable in three months in the East. There were numerous smaller sales, but the aggregate of the whole is not large. All sales stipulate for prompt delivery, and there are urgent applications for prompt delivery on previous contracts, showing that buyers are not allowing a sufficient margin for ordinary vicissitudes in making their purchases. There appears to be something out of joint in the iron trade, for in spite of the reported reduction in stocks and the large consumption which is evidently in progress, all changes are in the direction of lower prices. Quotations unchanged.

### Foundry.

Southern Coke, No. 1.....	\$13.25 @	\$13.50
Southern Coke, No. 2.....	12.00 @	12.25
Southern Coke, No. 3.....	11.25 @	11.50
Ohio Soft Stone Coal, No. 1.....	16.00 @	16.25
Ohio Soft Stone Coal, No. 2.....	15.00 @	15.25
Mahoning and Shenango Valley.....	14.75 @	15.00
Hanging Rock Charcoal, No. 1.....	18.00 @	19.25
Hanging Rock Charcoal, No. 2.....	18.00 @	18.50
Tennessee and Alabama Charcoal, No. 1.....	15.50 @	15.75
Tennessee and Alabama Charcoal, No. 2.....	14.50 @	14.75

### Forge.

Gray Forge .....	11.00 @	11.25
Mottled Neutral Coke.....	10.75 @	11.00

### Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	18.00 @	19.00
Lake Superior Car Wheel and Mal- leable.....	17.75 @	18.00

## Baltimore.

BALTIMORE, March 13, 1899.

The past week has been marked by a decidedly increased demand in nearly all lines, occasioned partly by the influx of out of town buyers into Washington for the inauguration ceremonies. These buyers, desiring to include business with pleasure, have flocked over from Washington to make their purchases and dealers in all lines have been busy. While the increased demand has been occasioned in part by the above-mentioned affair, there has been an increased desire to buy by the city trade and by the country merchants who remained at home and ordered by mail. The portions of the trade most affected have been Rivets from stock, Tubes and Tire Steel. The outlook is good. The coming of "building weather" is seeing the demolition of a number of old structures which will be replaced by modern buildings.

**Bar Iron.**—While the same quotations hold good there are in some instances signs of a breaking away by some dealers, and on large orders the following prices are likely shaded. We quote 1.85¢ @ 2¢ per stock, and 1.80¢ @ 1.85¢ from mill.

**Plates.**—Some fair lots have been disposed of, and there are in the market several other orders for which very low prices are named. Business in this line is fair, but no advance in prices can be noted.

**Merchant Steel.**—Tire Steel has been going fairly fast to the various wagon builders, but at the lowest prices. We quote: Machinery Steel, 2.15¢ @ 2.30¢; Tire Steel, 2.20¢ @ 2.25¢; Toe Calk, 2.35¢ @ 2.45¢; Spring Steel, 2.50¢ @ 2.60¢.

**Tubes and Pipe.**—Boiler Tubes have been moving in a very encouraging way, but at an increased discount. Several orders have been placed at 70 % off, and we are informed that for large, desirable orders an additional 5 % has been granted. From stock the same quotations as last rule.

## St. Louis.

(By Telegraph.)

Office of *The Iron Age*,  
Bank of Commerce Building,  
St. Louis, March 15, 1899.

**Pig Iron.**—The market continues in the same weak and unsettled condition noted in our last report. The volume of business is satisfactory, but prices continue to keep growing weaker daily. Gray Forge is offered at \$8.10, f.o.b. cars Birmingham, and in some cases \$8 is accepted. No. 2 Foundry is easily obtainable at \$9 and Car Wheel Irons are being offered at very low prices. In fact the entire line is in a partially demoralized condition from which it seems impossible to extricate it. Furnacemen claim to be selling Iron at cost, and we know of one or two cases where preparations are in progress to "blow out." This seems to be the only solution of the question. Stocks of Iron on the furnace banks are large and increasing, and the immediate future does not contain anything of an encouraging nature, so that there is no inducement to continue, whereas to "blow out" seems the only thing to do. Consumers are buying only as their needs require, and, as stated in these columns for two months past, are paying less for each additional purchase. We quote as follows for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry, \$13.50 @	\$14.00
Southern Coke, No. 2 Foundry, 12.25 @	12.50
Southern Coke, No. 3 Foundry, 11.75 @	12.00
Southern Gray Forge.....	11.25 @ 11.50
Southern Car Wheel.....	18.00 @ 18.75
Lake Superior Car Wheel.....	17.00 @ 17.50
Ohio Foundry.....	16.25 @ 17.00
Missouri Charcoal, No. 1 Foundry.....	13.50 @ 14.00

**Bar Iron.**—Mills report a large and increasing trade. Car manufacturers are very busy and local builders have secured a number of desirable orders and have bought Iron quite heavily. Prices are well maintained at 1.57½¢ @ 1.60¢, f.o.b. cars, East St. Louis. Jobbers report a brisk demand.

**Barb Wire.**—The demand for Barb Wire is unprecedentedly heavy, not from any particular locality, but apparently from every portion of the country where Wire is used. Mills are crowded with orders and prices are strongly held at \$2.20 for Painted, in carload quantities to jobbers, and \$2.60 for Galvanized. It is reported that an advance will shortly be made of about 10¢ per cwt.

**Wire Nails.**—Mills are crowded with orders and are unable to ship as promptly as the demand calls for. During the past week the weather has been of a spring nature and a perceptible increase in trade was noted by the jobbers, indicating that a heavy trade is in sight and only awaits good weather for further development. Prices are strong at \$1.70 for carload lots to jobbers. A meeting of the Nail manufacturers is in progress in Chicago to-day and rumor says an advance in price is among the probabilities.

**Pig Lead.**—This metal seems to be improving, and some sales are reported at 3.70¢. During the past week sales have

been made at from 3.65¢ to 3.70¢, and at the close to-day this seems to be a fair average quotation. The demand is increasing and further improvement is likely.

**Spelter.**—No improvement can be noted in this department. Sales continue to be made at 3.95¢, with an occasional car lot at 3.97½¢. Stocks continue to accumulate, however, and there does not appear to be much prospect for any early improvement.

### Freight Rates.

Pig Iron.	Per ton.
Birmingham, Ala., to St. Louis.....	\$3.25
Chattanooga, Tenn., to St. Louis.....	3.00
Sheffield, Ala., to St. Louis.....	2.80
Barb Wire and Wire Nails.	Per cwt.
Pittsburgh, Pa., to St. Louis.....	22¢
Cleveland, Ohio, to St. Louis.....	18¢
Anderson, Ohio, to St. Louis.....	14¢

## Cleveland.

CLEVELAND, OHIO, March 14, 1899

Although there are not wanting indications that the Iron Ore men and the buyers will soon reach an understanding, the story told over and over again for the past six or seven weeks must be told again. The sales of Ore to be sent down this year have been confined to a few small lots of special Ore, the prices paid being no indication of the regular market prices that will prevail when the buying season actually opens. There is a difference of about 50¢ per ton between the buyers and sellers, if the talk now being indulged in may be called negotiations. It seems highly probable that the vesselmen will finally see the fairness of a schedule of rates that will permit the buyers and sellers to come together. This can be accomplished by making the Ashland rate \$1 per ton and the other rates correspondingly low. At present no reason exists for altering the opinion expressed last week that good Bessemer will sell for \$4 per ton, f.o.b. vessels at lower lake ports, and that non-Bessemer will bring close to \$3 @ \$3.15.

**Iron Ore.**—The call from the furnaces during the past week was for about 32,000 tons of Ore, as compared with 28,000 tons for the same week last year. Buyers are reaching out slowly for the unsold Ores on the docks. Several thousand tons of non-Bessemer Ores were sold during the past week at an average price of \$3.10 per ton. The navigation season will probably open late, but estimates still place the Ore shipments for '99 at 9,000,000 tons. The output from the Mesabi Range is now placed at from 450,000 to 500,000 tons, and this will probably just about make up the decline in the supply from the old mines.

**Pig Iron.**—Bessemer are reported stronger. A local firm, after filling several orders at \$13.60, declined last week to accept additional demands at that figure, and give out quotations at \$13.70 @ \$13.80. Forge Irons also seem a trifle firmer, while Foundry Irons just about hold their own. The general situation is considerably improved, and if this continues the opening of the Ore market cannot be longer delayed.

**Muck Bar.**—A fair demand for Muck Bars is reported at \$24.25 @ \$24.50.

**Nails.**—The market continues to improve. The demand for Wire Nails at \$1.50, f.o.b. cars Cleveland, is excellent, and indications are not wanting that this price will be advanced within a few days.

**Old Rails.**—The market is rather weak, and only scattering sales are reported. Old Americans are quoted at \$19 @ \$19.25, Cleveland.

**Scrap.**—Dullness again characterizes the market for old material. No. 1 Railroad Wrought continues to sell in small lots at \$15 @ \$15.25 per ton, and Wrought Turnings at \$8.

**Freights.**—The Central Traffic Association is meeting in Chicago to-day, and will give attention to the claim of many Iron manufacturers that certain Irons are rated too high, and that there should be a new classification all around. The action of the association is awaited with much interest. Present rates are.—Ore: Cleveland to Valley Points, 62½¢; Cleveland to Pittsburgh, \$1.05. Pig Iron: Valley Points to Cleveland, 60¢ per ton; to Pittsburgh, 60¢. Muck Bar, Blooms, Billets, Scrap, Iron and Steel Rails, Old Wheels, &c.: Valley Points to Cleveland, 70¢ per ton; to Pittsburgh, 75¢ per ton; to Boston, \$3.50 per ton; to New York, \$3.10 per ton; to Philadelphia, \$2.70 per ton.

## New York.

Office of *The Iron Age*, 98-102 Reade street, New York, March 15, 1893.

**Pig Iron.**—Sellers report a somewhat greater activity, and quite a number of large transactions, both in Northern and Southern Iron, are reported to have been closed during the past week. The Buffalo producers deny that they have offered Iron at Troy and Albany at the price named in our last report. We quote Northern brands at \$14.50 @ \$15.25 for No. 1; \$13.75 @ \$14.50 for No. 2, \$12.75 @ \$13.50 for Gray Forge, tidewater. Southern Iron, same delivery, \$14.25 @ \$14.75 for No. 1; \$13.25 @ \$13.75 for No. 2 and No. 1 Soft; \$12.25 @ \$12.50 for Gray Forge.

**Spiegeleisen and Ferromanganese.**—Business in foreign material is quiet at nominally \$56 @ \$56.50 for 80 % Ferromanganese and \$25.25 @ \$25.50 for 20 % Spiegeleisen.

**Billets and Rods.**—The market is quiet but stronger in domestic Billets, as the result of the rise in the Pittsburgh and Wheeling markets. We quote Steel Billets, tidewater, \$25 @ \$25.25; foreign, \$29 @ \$29.50; Wire Rods, \$32.50 @ \$32.75; foreign Wire Rods, \$40 @ \$40.50, and Swedish Rods, \$52.50 @ \$53.

**Steel Rails.**—Sellers report no business of consequence, and the market is dull. The only important order talked of is one for 16,000 tons. There is a good deal of activity in Street Rails and Girders. The latter are nominally quoted \$34 @ \$35, which figure is cut, however, to secure any desirable business.

**Track Material.**—Business is dull. Spikes are quoted at 1.90¢ @ 1.95¢; Fish Plates at 1.55¢ @ 1.60¢; Track Bolts, square nuts, at 2.45¢ @ 2.50¢, and hexagon nuts at 2.55¢ @ 2.60¢, delivered.

**Manufactured Iron and Steel.**—The Morrison bridge at Alton has been placed with the Union Bridge Company, the material for it being taken by works east of the Allegheny Mountains. About 4000 tons of Steel will enter into the structure. Nothing of importance has been booked in this market during the past week in Architectural or Bridge work. In the latter a bridge over the Harlem ship canal calling for about 900 tons of material comes up toward the close of this month. Some good buildings are in sight, but will not be closed for a few weeks. Ship work is light. The local Boiler trade is dwindling more and more to the proportions of mere repair work. We quote: Beams up to 15 inch, 2¢ @ 2.15¢; 20-inch, 2.35¢ @ 2.40¢ for round lots; Angles, 1.8¢ @ 2¢; Universal Mill Plates, 1.85¢ @ 1.90¢; Tees, 2.10¢ @ 2.30¢; Channels, 2.10¢ @ 2.20¢, on dock. Car Truck Channels, 2¢ @ 2.10¢. Steel Plates are 1.80¢ @ 2¢ for Tank; 2.10¢ @ 2.25¢ for Shell; 2.25¢ @ 2.50¢ for Flange, and 2.50¢ @ 2.80¢ for Fire Box, on dock. Refined Bars are 1.65¢ @ 1.9¢, on dock, and common 1.55¢

@ 1.60¢. Scrap Axles are quotable at 1.90¢ @ 2.10¢, delivered. Steel Axles, 1.85¢ @ 2¢, and Links and Pins, 1.85¢ @ 2.10¢; Steel Hoops, 1.80¢ @ 1.90¢, delivered.

**Merchant Steel.**—The market continues irregular, with Machinery at 1.80¢ @ 2¢; Toe Calk, 2¢ @ 2.25¢; and Sleigh Shoe, 1.80¢ @ 1.90¢.

**Old Material.**—There has been some inquiry lately for Old Car Wheels. We quote nominally Old Iron Rails, \$16.75 @ \$17; Steel Rails, \$13.50 @ \$14, and No. 1 Scrap, \$16; Old Car Wheels, \$13 @ \$13.50.

## Metal Market.

**Copper.**—There have been no new developments the past week in the market for Ingot. Buyers manifest the same indifference and reserve that they have displayed since the beginning of the year, while sellers maintain a remarkable exhibition of firmness, considering the somewhat adverse circumstances against which they have had to contend. Present appearances are that the market would be in a thoroughly demoralized condition at the present time had not the scheme of restricting production been carried to a successful issue. As matters stand, it seems difficult to market outside lots at prices ½¢ below the minimum rates quoted by the producers. About 11½¢ @ 12¢ for Lake Superior Ingots and 10½¢ @ 11¢ for common Casting Copper would appear to fairly reflect market value at the moment. Late on Wednesday there were rumors of sales having been made to consumers at 11½¢ for Lake Superior Ingot and 10½¢ for common Casting Copper. We print the February report of production elsewhere.

The monthly report of the Bureau of Statistics affords the following comparison of exports of Copper from the United States during the month of January and the seven months ending January 31:

To	January		Seven Months	
	1893.	1892.	1893.	1892.
United Kingdom.....	4,096	4,569	25,408	17,592
Germany.....		257	78	1,013
Other Europe.....				200
Total.....	4,096	4,826	25,486	18,705

To	January		Seven Months	
	1893.	1892.	1893.	1892.
United Kingdom.....	595,455	1,072,221	1,744,117	11,850,756
Germany.....	170,379	686,979	2,087,790	4,267,054
France.....	1,110,857	1,541,878	6,239,347	16,863,441
Other Europe.....	880,726	860,158	5,688,505	10,140,715
Other countries.....		632	57,787	41,031
Total.....	2,757,417	4,164,868	15,817,546	43,162,997

**Pig Tin.**—The advance in prices that was established at the close of the period covered by last week's review has been followed by a reaction of about ¼¢ per lb in the face of higher average quotations from London. Official records show transactions in the meantime involving several hundred tons, and it was rumored that quite as much, or more, tin changed hands privately in a speculative way. There was some diversity of opinion regarding the volume of movement into the channels of consumption, but evidence was mostly to the effect that the distribution will lose nothing by comparison with the average for this season of the year. That this should be the case is not surprising in view of the fact that several holders have, directly or through convenient agencies, urged their customers to stock up before the proposed 4¢ duty goes into effect, and thus prevent the transfer of neat sums of money from the pockets of the consumers

to those of the importers during the next three months. Evidence is wanting, however, of anxiety on the part of those operators to buy more Tin than they are inclined to sell, despite the glowing arguments they present for others to buy immediately and freely. Shipments from the Straits during first half of March were advised as having been 1500 tons to Great Britain and America, and 150 tons to the Continent. There was a sale on the Metal Exchange on Wednesday of 10 tons for April delivery, at 21.05¢. Bids of 21¢ were made for March and April, and 21.10¢ for May and June.

**Pig Lead.**—Prices have been held quite firmly at the higher level established last week, but buyers have manifested extreme indifference, as though perfectly content to let the future take care of itself, and confident in the opinion that supplies will be quite full enough to meet the demand. Hence a quiet, although apparently firm, market at the present time, with the range of 3.90¢ @ 3.95¢ quoted for carload or larger lots.

**Spelter.**—There are liberal offers from the West to sell for April and later shipment at 3.97½¢ there. At present rail freight that price is equivalent to 4½¢ @ 4.27½¢, delivered in the East. Few orders have passed through this market at the rate named, however, and Eastern buyers seem disinclined to purchase at all freely until after the opening of navigation. Spot stock is quoted at 4.30¢ @ 4.35¢, according to size of lot.

**Antimony.**—Demand has been only fair. Prices have shown some little irregularity, yet no radical change. Current quotations are 10¢ @ 10½¢ for Hallett's, 10½¢ @ 10¾¢ for LX and 10¾¢ @ 10½¢ for Cookson's.

**Tin Plate.**—Slightly higher prices rule for ordinary Cokes on the spot, and the foreign market for that class of Plate is firm also. Very fair sales have been made,

but nothing transpired in the way of unusual dealings. Terns are somewhat lower, as are Wasters, with only a moderate business passing. Bright Charcoals without change in price and selling rather slowly. Spot quotations are as follows: Coke Tins—Penlan grade, IC, 14 x 20, scarce; J. B. grade, do., scarce; Bessemer full weight, scarce; light weights, \$5.12½ for 100 lb, \$5 for 95 lb, \$4.90 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60 @ \$5.65; Siemens Steel, IC basis, \$5.75; IX basis, \$6.85. Charcoals—Melyn grade, IC, scarce; Crosses, \$8; Allaway grade, IC, \$5.70; Crosses, \$7; Grange grade, IC, \$5.80; Crosses, \$7.10. Charcoal Terns—Worcester, 14 x 20, \$5.70; do., 20 x 28, \$11.35; M. F., 14 x 20, \$7.25; do., 20 x 28, \$14.50; Dean grade, 14 x 20, \$5.30 @ \$5.37½; do., 20 x 28, \$10.50 @ \$10.70; D. R. D. grade, 14 x 20, \$5.20; do., 20 x 28, \$10.30;

Dyffryn, 14 x 20, \$5.50; do., 20 x 28, scarce. Wasters—S. T. P. grade, 14 x 20, \$5; do., 20 x 28 \$9.70; Abercarne grade, 14 x 20, \$4.95; do., 20 x 28, \$9.50.

## Coal Market.

The Coal sales agents, at their meeting in this city on Tuesday, made a substantial drop in prices, to take effect at once. The comparison of spring opening prices for two years stands as follows, all f. o. b.:

Free Burning.	Broken.	Egg.	Stove.	Chest-
1892.....	\$3.65	\$3.75	\$3.90	\$3.65
1893.....	3.90	3.90	4.15	4.15

A more active movement will be expected, now that consumers have no motive for holding off for a break. There is plenty of Coal of all sizes, except Pea and Buckwheat. Spot cargoes may be quoted as follows: Pea, \$2.50 @ \$2.75; Buckwheat, \$2 @ \$2.15. The trade are much interested in the election of directors for the New England road, held on Tuesday, showing that McLeod is "on top" and will have much influence on prices.

A dispatch from Pottsville says that 17 collieries in that section were closed by the floods.

The Bituminous Coal market has "no starch" in it, there being coal in abundance, and sellers are competing to an extent that makes prices very irregular. Some sales are made at the lowest mark. The big contract for the Long Island Railroad, to be closed at once, excites much curiosity, for the terms agreed upon, if they can be ascertained, will to some extent control other contracts to be renewed at this season. There is also a question about railroad tolls for the coming year. The association prices take effect in April.

The amount of Anthracite shipped from the mines last week was 884,000 tons, an increase of 173,500 tons compared with the same week last year. The comparison since January 1 is about the same for the two years.

Vessels are scarce: \$1.25 and discharge to Boston.

The Pennsylvania Railroad Company is about to order 2000 coal cars, which will cost nearly \$1,000,000.

## Financial.

The currency situation operates to discourage expansion in trade, but confidence is felt that a wise course will be pursued by the Government in seeking to extricate itself from present difficulties. Perhaps the least satisfactory of all is the continuance of enormous imports, but the amount of produce awaiting shipment is so great that a change for the better in the relative amount of exports must soon take place. The total imports at the port of New York for February, exclusive of specie, is \$52,000,000, an amount nearly \$8,000,000 in excess of the corresponding month last year, which up to that date was the most active February in the history of the past. The shipments, on the other hand, showed a marked decline in the total of produce and merchandise for the month, \$22,769,856, which is \$8,000,000 below the corresponding total of last year, and is less than any previous total for a similar period since 1887. Touching the future augmentation of exports, the report of the Agricultural Department just at hand confirming suspicions that estimates made heretofore of the last yield of wheat were too low by 31,000,000 bushels, is hopeful. The extraordinary receipts from farmers' hands during the winter are thus partially explained.

The stock market was unsettled and weak, influenced by stringent money and the uncertainties connected with the Reading Railroad and its New England con-

nections. The feature on Thursday was a fall in Reading and in New England, and on Friday the grangers were affected by decreased earnings and the prospect of a strike, although a combination of general managers of roads centering at Chicago, to resist the demands of the switchmen, would, it was thought, tend to a compromise. Reading was influenced by the prospect of an issue of receiver's certificates, and New England by the annual statement, although at the decline there appeared to be good buying of it. Electric declined sharply on offerings of long stock. At the close there was a rally on the report that the Chicago banks had offered the Treasury \$3,000,000 in gold and that St. Louis and other Western cities would make up a large aggregate. The agreement between the New Haven Consolidated Railroad and the Boston & Maine, for a division of New England traffic, was ratified by the directors of both corporations on Saturday. On Monday grangers were favorably affected by news that the switchmen's organization at Chicago had decided not to strike. United States bonds were quoted as follows:

U. S. 4½s, 1891, extended.....	99½
U. S. 4s, 1907, registered.....	111½
U. S. 4s, 1907, coupon.....	112½
U. S. currency 6s. ....	107½

The weekly bank statement shows a decrease of \$1,859,850 in reserve, which now stands at \$4,643,275 surplus. The loans show a loss of \$8,141,900, the legal tenders decreased \$5,555,200 and the deposits other than United States are down \$14,795,000.

The poor bank statement presaged a calling in of loans and was reflected in a firmer tone for money. Banks were reluctant to grant renewals, and there being little time money in the market quotations were nominal. Little was done in commercial paper and nothing under 6 per cent.

The demand for sterling exchange and higher rates for money, led to a sharp decline in rates. The selling of stocks for London failed to check the drooping tendency. Posted rates were \$4.86½ @ \$4.88½.

Bar silver closed in London at 38½ d. per ounce. The commercial price of bar silver in New York was 83½¢ per ounce.

The first steps toward a permanent organization of the transcontinental lines were made by the freight agents in session in Santa Barbara, Cal. They agreed to form an association to be called the "Transcontinental Freight Rate Committee," in which all transcontinental lines, except the Great Northern, Northern Pacific and Canadian Pacific will be parties.

The general markets were quiet owing to questions in finance, stringent money and unfavorable weather. The Treasury was understood to be in an easier position, but Mr. Carlisle was reported to have resolved to say little respecting the policy to be adopted, choosing rather to act as the best interests of the public may seem to demand. The wheat market was again lower, May wheat touching 77½¢, the lowest point on the crop. Corn also declined. Provisions dull, Cotton without change. Coffee very dull.

The receivers of the Philadelphia & Reading Company have given to the public a statement of the condition of the floating debt of that property. The total amount of the floating debt is \$18,472,828 and the assets including more than \$10,000,000 for coal on hand and due for coal sold are \$15,779,784.

England will build three new battle ships during the coming year. One just contracted for is estimated to cost \$4,850,000. It is stated that the heavy guns for these vessels will be constructed of iron and wire.

## Detroit.

DETROIT, MICH., March 13, 1893.

In reviewing the market here it might be well to say that it must be considered from two points of view. First, as buyers of Iron for our foundries here, and second, as sellers of Iron from furnaces both here and elsewhere in the Lake Superior Charcoal region, whose sales agents are in this market.

From the first point of view the buyers will say that the market has been quite active. There have been several large lots both of Northern and Southern Coke Iron sold at good figures. Slight concessions were made for favorable deliveries on round lots of some low-grade Foundry. It would seem as if each particular deal carried with it the necessity of some slight concession in order to consummate the business. Northern Coke Irons were held firm, and transactions were of a satisfactory nature, perhaps a little more so to the furnacemen than they have been for some time.

Of Lake Superior Charcoal Iron some round lots were purchased locally, and quite a large volume of business for delivery in the East was closed and there still remains unsatisfied considerable inquiry which it is thought will develop into actual transactions within the present month. It looks as if an early buying of Lake Superior Charcoal Iron for Eastern consumption would be seen. Altogether the market may be considered good for this grade of metal, and quotable to-day as follows:

Lake Superior Charcoal Iron, all numbers .....	\$16.50 @ \$17.10
Lake Superior Coke, Foundry, all ore.....	15.50 @ 16.00
Lake Superior Coke, Bessemer.....	15.00 @ 15.50
Standard Ohio Blackband (40 per cent.).....	15.50 @ 16.00
Southern No. 1.....	14.0 @ 14.50
Southern Gray Forge.....	12.50 @ 13.00
Jackson County (Ohio) Silvery.....	17.25 @ 17.75

## Boston.

Office of *The Iron Age*, 146 Franklin St., }  
BOSTON, March 15, 1893. }

**Pig Iron.**—There is a very fair trade in Pig Iron, with the feature that small lots at hand have been hard to get of late, on account of delayed shipments. In one case a single carload of No. 1 Iron was divided among three or four customers by the dealers, in order to keep them along. In another case a small lot of No. 1 Iron, wanted for immediate melting, could not be found. This state of the market has rendered small lots firmer, and it has also led the foundry people to the placing of orders for Iron to arrive more freely than they would have done had they not been pinched a little. The foundry people continue busy and are using a good deal of Iron, but doubtless the slight stringency will be over as soon as shipments arrive. Quotations are sustained on Southern Iron, at the following figures for Iron on the dock in Boston: No. 1, \$15.50 @ \$16; No. 2, \$14.50 @ \$15; No. 3, \$14 @ \$14.50. Virginia Irons are about 50¢ per ton more. Pennsylvania Iron is quiet in this market, with attention being given more and more largely to Southern Iron. Quotations are unchanged for Iron at shipping port as follows: No. 1, \$15 @ \$15.50; No. 2, \$14 @ \$14.50; Gray Forge, \$13.50. Other Western Irons are steady in prices at \$17.50 @ \$19, according to quality and point of shipment.

**Bar Iron.**—Bar Iron is easy in the matter of values, but the stronger market on Bessemer Pig, mentioned below, is being felt, and the position is looking firmer for Bars that are made outside of New England. New England, or real Iron Bars, are selling well, but at easy prices: Ordinary Bars from mill, 1.60¢ @ 1.65¢; from store, 1.65¢ @ 1.70¢. The best



known Bars from Puddled Iron are quoted at 1.85¢ @ 1.95¢ from mill, and at 2.10¢ @ 2.25¢ from store. Norway and Swedish Irons are still unsettled, with the report that the store prices continue to favor buyers. From store, this market may be quoted at \$65 @ \$67 for Bars and Shapes.

**Steel and Steel Plates.**—Business continues good in Steel, with the feeling that the market is firmer. Prominent dealers here have letters from the largest Iron houses in Pittsburgh, claiming that Bessemer Pig is \$1 higher, and that this advance, if maintained, must result in higher prices for both Billets and Finished Steel. The advices also suggest the immediate fixing of contracts where prices have been proposed; also that agents watch the markets very carefully, in order to know just how to make future prices. Hence the market here is firm at: Bessemer Steel, 2.10¢ @ 2.20¢; Machinery, 2.05¢ @ 2.20¢; Tire and Sleigh Shoe, 2¢ @ 2.10¢; American Cast, 7¢ @ 7½¢; English Cast, 13¢ @ 15¢; American Steel Rails, \$29 at mill. The New England railroads seem to be rather at a standstill about buying Rail's Steel Plates are reported quiet, with prices easy. The quotations mentioned are: Tank, 1.90¢ @ 1.95¢; Shell, 1.95¢ @ 2.05¢; Flange, 2¼¢ @ 2.30¢; Fire Box, 2.60¢ @ 3.30¢.

**Structural Iron.**—Structural Iron is a very prominent feature in this market. Building is good and promises to be better. There are a number of good-sized contracts on the way, but none lately closed. But competition is very brisk, and prices have to suffer the consequences. Still nobody is willing to mention any lower quotations: Beams and Channels, 2.10¢ @ 2.20¢, from mill; from store, 2¼¢ @ 3¢; Angles, 2¢ @ 2.10¢, from mill; from store, 2¼¢ @ 2½¢; Tees, 2.40¢ @ 2½¢, from mill; from store, 2½¢ @ 2¾¢.

**Nails.**—Nails begin to be in better demand as the spring approaches. A good trade is anticipated. The test of the drawing strain of Cut Nails, as compared with Wire Nails, is reported soon to come out. It seems that the principal investigator at the United States Arsenal, at Watertown, has been sick. Nails are quoted at \$1.60 per keg for small lots, and at \$1.50 for car lots, for both Iron and Steel Cut Nails, under the new list of extras. Steel Wire Nails are quoted at almost exactly the same prices as Cut Nails, except that there is a slight variation in the list of extras.

**Pipes and Tubes.**—Trade in Pipe is fair, with prospects good, and a good trade is looked for as soon as the snow and ice are gone. A good many New England towns and small cities have voted "new and improved waterworks," at their annual March meetings. Prominent Pipe manufacturers have accepted orders from concerns here, "to tide over a dull March trade," as they say, "after which the trade will take care of itself, and prices will be stronger." Here the quotations on Pipe and Boiler Tubes are unchanged, the latter being quoted at 65 % off on all sizes.

**Scrap.**—The demand for Old Iron is not improved in the least, though it is at the usual season of a little scarcity. No. 1 Wrought Scrap is not quotable above 50¢ per 100 for ordinary lots, though selections, in good lengths and sizes, and Old Horse-shoes, are quotable at 60¢ @ 70¢, as to quality.

B Talbot, who has been connected with the Chattanooga steel works and rolling mill of the Southern Iron Company, has resigned, to accept the post of manager of the steel department of the Pencoyd Iron Works, A. & P. Roberts Company, Pencoyd, Philadelphia.

## Pittsburgh.

(By Mail.)

Office of The Iron Age, Hamilton Building, }  
PITTSBURGH, March 14, 1893. }

The developments in the Iron and Steel trades within the past week have been of a nature that will admit of no denying the fact that the situation has considerably improved within the last month. Commencing with Pig Iron, it can be stated that Bessemer is in fair demand with a majority of furnaces refusing to sell at less than \$13.50. The Steel market is in excellent shape, with mills well sold ahead and prices about \$1 per ton higher than a month ago and a probability of still further advances before this month is out. Plates and Structural Material are in better demand, with no improvement in prices. Rods, which have been dull and neglected for some time, are looking up, with a better understanding among makers regarding prices than has existed for some time. Wire and Wire Nails are undoubtedly in the lead as far as improvement in demand and prices is concerned. An advance of fully 15¢ per keg in Wire Nails has occurred, while Plain and Galvanized Wire is from \$2 @ \$3 per ton higher. Connellsville Coke is also reported as slightly improved in price. In Merchant Steel and Pipes and Tubes the situation is not satisfactory, but now that spring trade has opened up so auspiciously an improvement in demand and prices for both is probable. It will then be seen that the situation as a whole shows considerable improvement, particularly as regards tonnage, and, while prices on some lines are very close to cost, there has been some improvement in this direction with prospects of further betterments in the near future.

**Ferromanganese.**—Demand is quiet, with prices unchanged at \$59, Pittsburgh. We are advised of a sale of 50 tons at that price.

**Wire Rods.**—Some little improvement in this department is noted, and some extremely low quotations have been withdrawn, and we now quote on a basis of \$30, Pittsburgh. When the present high prices for prompt Rod Billets are considered, it will be seen that even at \$30 there is very little margin of profit, and the impression prevails that if the present prices of Steel are maintained a further advance in Rods is not improbable. The active condition of the Wire-Nail market is also having its effect on Rods, and indications point to better prices than have ruled for some time past.

**Muck Bars.**—The market is almost lifeless and very little material is changing hands. We quote nominally at \$24.25, Pittsburgh, for best grades of No. 1 Bars, with a probability that this price would be shaded for a good sized order.

**Steel Rails.**—The volume of business is only fair, and, while considerable tonnage is in sight, new business is coming forward in a manner that is rather disappointing. Prices are unchanged at \$29 at mill for standard sections.

**Structural Material.**—A very considerable increase in tonnage is reported by makers in this market, and indications favor a heavy volume of business for some time to come. Builders who are erecting only moderate-sized buildings are realizing the fact that, with present low prices of Structural Material, it is to their interest to substitute Steel in place of Wood, and this is leading to a very largely increased demand. Makers firmly believe that the present season will be a very active one as far as demand is concerned, although it is thought that prices will rule largely in favor of buyers on account of active competition. There is a particularly heavy demand for Beams of the

smaller sizes, and also for Bridge material of the various kinds. For ordinary run of orders prices are ruling as follows: Beams and Channels, 1.80¢ @ 1.90¢, f.o.b. cars Pittsburgh; Angles, 1.70¢ @ 1.75¢; Z Bars, 1.90¢; Tees, 2¢ @ 2.10¢. It is estimated that these prices continue to be shaded, especially in Eastern markets, where Pittsburgh has been a heavy seller of Structural Material for some little time past.

**Plates.**—As far as demand is concerned the market is in fairly satisfactory condition, but prices continue to be shaded very liberally. For delivery in Eastern markets, Pittsburgh is reported as taking some contracts at very low prices. This applies to Tank Steel, which seems to be shaded more liberally than any of the other kinds of Plates. For ordinary business, prices quoted below are ruling, but for desirable orders makers continue to shade our quotations more or less. We quote as follows: Ordinary Fire Box, 2.25¢ @ 2.75¢; Best Quality, 3¢ @ 3.25¢; Flange, 2¢ @ 2.10¢; Tank, 1.65¢ @ 1.70¢; Shell, 1.80¢ @ 1.90¢; Universal Plates, 1.70¢ @ 1.75¢.

**Wire and Cut Nails.**—As intimated in our report of last week the very heavy demand for some time past for Wire Nails, together with the fact that mills have their capacity sold up for some time, has led to a further advance in prices. We now quote Wire Nails on a basis of \$1.50, f.o.b. cars Pittsburgh, and \$1.52½ Cleveland, in carload lots, and there are those in the trade who firmly believe that still higher prices will prevail before long. Even at the above prices there is not much disposition on the part of mills to book very largely ahead, and in one case at least a firm offer for a large block of Wire Nails on the basis of \$1.50, Pittsburgh, was declined, the mill stating that they could not promise any deliveries before May 1 next. For less than carload lots \$1.55 and \$1.60 is being obtained. In the Cut-Nail trade we can report a slight improvement in demand, but there has not been that increase in business that makers looked for with the opening of spring trade. Some in the trade express the belief that this is due largely to the new card, while others state that it comes from the fact that the consumption of Wire Nails is steadily increasing, which, of course, means a decreased consumption of Cut Nails. As near as can be learned mills continue to quote on the basis of the new card, which is \$1.25 for 60d, Wheeling district.

**Pipes and Tubes.**—There is nothing new to report this week, although indications point to an increased demand in view of the opening up of spring trade. There continues to be considerable irregularity in prices, which affects all sizes of Pipes and Tubes more or less. With the advent of good weather, however, permitting outside work, makers expect a material improvement in demand, which will pave the way for better prices. It is claimed that at prices ruling for some time past there has been little or no profit to manufacturers, and this is doubtless the case.

**Wire.**—The extraordinary demand for all kinds of Wire reported in these columns for several weeks past, and which as yet shows no signs of abatement, has caused a decided advance in prices, and we now quote Painted Barb Wire at 2.10¢, and Galvanized at 2.50¢ in carload lots, Pittsburgh. For small quantities 2 15¢ @ 2.55¢ is being obtained. Not for many months have the Wire mills been as favorably situated as regards orders as at present, and it is the impression that further advances in prices before long are not improbable.

**Merchant Steel.**—Buyers of this class of material are somewhat scarce, and mills showing a disposition to shade prices in order to secure business has weakened



prices to some extent, and it is claimed very low prices have been named recently for Machinery, Spring and Tire Steel. Plow Steel is in fair demand, and prices are ruling at 1.95¢ @ 2¢; Tool Steel is in moderate demand, with prices ranging from 6¢ upward, according to grade.

**Connellsville Coke.**—For the week ending March 4 there were 12,913 ovens in the Connellsville region in blast, 4416 idle, with a total production for the week of 125,984 tons. We are advised that prices have shown a tendency to stiffen up within the last week or two. We now quote Connellsville Coke at \$1.60 @ \$1.70 in tons of 2000 pounds, f.o.b. cars in Connellsville region. Furnace Coke is quoted at \$2.15 to dealers and \$2.30 to consumers.

**Sheets.**—Demands continues heavy, particularly for lighter gauges, and a heavy business will doubtless be done between now and July 1. Prices are being maintained and we continue to quote Ordinary Sheets at 2.50¢ for No. 24; 2.60¢ for No. 26 and 2.70¢ for No. 27. For Soft Steel Sheets an advance of about \$1 per ton is charged on the above prices. For large contracts it is probable that prices given above are shaded slightly. There is also a heavy demand for Galvanized Sheets and prices are firm, with discounts ranging from 70 and 5% to 70 and 10%, according to order.

#### Freights.

Between Pittsburgh and	Group 1. Per ton.	Group 2. Per ton.
Mahoning Valley, Shenango Valley & Wheeling, W. Va.	\$0.80	\$0.75
Steubenville, Ohio.....	.50	.65
McKeesport, Pa.....	.30	.30
Braddock, Pa.....	.80	.85
Dunbar, Pa.....	.60	.75
Kittanning, Pa.....	.50	.55
Johnstown, Pa.....	.75	.80
From Pittsburgh, Beaver Falls, Homestead, Rankin, Braddock and McKeesport to	Group 1.	Group 2.
Albany, N. Y. ....	\$2.30	\$2.60
Baltimore, Md.....	1.70	2.00
Boston, Mass.....	2.70	3.00
Buffalo, N. Y.....	1.25	1.25
Findlay, Ohio.....	1.75	1.75
New York City, N. Y.....	2.30	2.60
Oswego, N. Y.....	2.40	2.60
Philadelphia, Pa.....	1.90	2.20
Richmond, N. Y.....	1.80	2.00
Syracuse, N. Y.....	2.30	2.60
Utica, N. Y.....	2.30	2.60

Rates shown under head of Group 1 will apply on Pig Iron, Mill Cinder and Scale, per gross ton, in carloads of 12 gross tons and over.

Rates shown under head of Group 2 will apply on Billets (Iron or Steel), Blooms (Iron or Steel), Borings (Iron or Steel), Chain Irons (in coils), Crop Ends (Iron or Steel), Ingots (Iron or Steel), Muck or Puddle Bars, Old Car Wheels and Axles, Old Rails, Scrap Iron, Scrap Steel, Scrap Tin, Slabs, unfinished (Iron or Steel), and Wire Rods (in coils), per gross ton, and on Ingot Molds and Cast-Iron Pipe per net ton, in carloads of 12 tons, net or gross, and over.

(By Telegraph, March 15.)

**Pig Iron.**—The Iron market the past week has been one of considerable activity in Bessemer Pig and for delivery in March and April prices have advanced about 25¢ per ton. The consumption of Soft Steel for some months has been exceedingly heavy and is increasing right along and this has carried with it a corresponding increase in the consumption of Bessemer Pig, which has reduced stocks very largely and placed furnaces in a more independ-

ent position regarding making contracts. There is less Iron in stock in the Pittsburgh district at this time than for some months past, and the same is true largely of furnaces in the Mahoning and Shenango Valley districts. This reduction in stocks, in connection with a very active demand for iron for March and April, has brought about the advance noted above. In the Pittsburgh district furnaces are asking from \$13.50 to \$13.75 for Iron, and some have refused to sell at the first-named price. The majority of the furnaces in this district are sold ahead for extended periods, and one of the largest producers, who is generally a seller of Iron, has been compelled to enter the market twice within the last month as a buyer, which has also had a material effect on the situation. Last week this concern made a purchase of 5000 tons of Bessemer Iron for delivery within the next two or three months. In the Mahoning Valley furnaces are asking \$13.25 at furnace, equal to \$13.85 Pittsburgh. It is claimed that there are no speculative features connected with the market at this time and that the advance was caused solely on account of consumption getting ahead of production for the time being. To-day the market is somewhat feverish, and predictions are made that Bessemer will touch \$14 before this month is out. As near as can be learned nothing has been done regarding Ore contracts, the impression being that buyers and sellers are playing a waiting game. The report of a combination of Ore producers is received with little credence in this city. Gray Forge is selling in only moderate demand at \$12.25, Pittsburgh. Foundry Iron is quiet at unchanged prices. We quote as follows:

Neutral Gray Forge.....\$12.25 @ ..... cash.  
 Au-Ore Mill.....12.50 @ .....  
 No. 1 Foundry.....13.75 @ \$14.00 "  
 No. 2 Foundry.....12.75 @ 13.00 "  
 Charcoal Foundry No. 1.....17.00 @ 18.00 "  
 Charcoal Foundry No. 2.....16.50 @ 17.00 "  
 Bessemer Pig.....13.50 @ 13.75 "

We note a sale of 5000 tons of Bessemer for delivery in March, April and May at \$13.65, Pittsburgh, and 3000 tons for March and April at \$13.70.

**Billets.**—The feverish condition of the Bessemer Pig market is reflected in Billets, and Steel during the past week has sold at prices ranging from \$22 to \$23, at maker's mill. Early last week a sale involving about 3000 tons for April, May and June delivery was made at a price equal to \$22, at maker's works. Later in the week Steel for March and April was sold at prices netting the makers from \$22.25 to \$22.85, and it is doubtful if Steel could be bought to-day at less than \$23 at maker's mill, and it is reported that several sales have been made at that price. Makers here and in the Wheeling district are well sold ahead, and are refusing to enter additional contracts except at the advanced prices. For this reason, few contracts for Steel for late delivery have been made, as buyers are holding off for a time, in the expectation that they will be able to buy to better advantage. As to the immediate future of the market the impression prevails that prices will go higher, and there are those who believe that Steel for prompt delivery will touch \$23.50 or \$24 before April.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, March 15, 1893.

The warrant market was fairly active early in the week, partly under the influence of more favorable reports from some branches of the Finished Iron trade, but interest has since moderated and the market is rather flat at present. Late transactions were at 40/10½ for Scotch, 34/7½ for Cleveland and 46/ for Hematite. Stocks in public stores include 346,000 tons of Scotch and 52,000 tons of Cleveland.

Pig Tin market movement has been eccentric and quite under the control of American operators. On free purchases the price advanced on Thursday to £95 5/, but a reaction followed, owing to uncertainties regarding American Tariff legislation, and dealings have latterly been restricted to smaller lots. Outside operators are less inclined to buy.

Copper has been firm, with fairly active speculation during the week, but consumers are buying less freely, now that speculators are active. Favorable statistics, together with strong demand for Copper for electrical purposes, tends to stimulate the market.

Dealings in Tin Plate have been moderate and the demand is fair. Prices unchanged but firmly held, the effect of liberal stocks being somewhat offset by high cost of Pig Tin, in sellers' opinion.

**Scotch Pig Iron.**—Makers' Iron finds moderate sale and prices are still slightly irregular.

No. 1 Coltness, f.o.b. Glasgow.....	54/
No. 1 Summerlee, ".....	50/
No. 1 Gartsherrie, ".....	48/
No. 1 Langloan, ".....	53/
No. 1 Carnbroe, ".....	43/6
No. 1 Shotts, " at Leith.....	52/6
No. 1 Glengarnock, " Ardrossan.....	49/6
No. 1 Dalmellington, ".....	46/6
No. 1 Eglinton, ".....	44/

Steamer freights, Glasgow to New York, 1/; Liverpool to New York, 7/8.

**Cleveland Pig.**—Demand is rather more active and the market firmer, with makers asking 35/6, f.o.b. shipping port, for No. 3 Middlesborough.

**Bessemer Pig.**—There has been more business and the market is firmer at 47/ for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

**Ferromanganese.**—The market is very quiet and without change. English 80 % quoted at £10. 15/, f.o.b. shipping port.

**Steel Rails.**—Some improvement noted in the demand, but prices unchanged. Heavy sections quoted at £4, f.o.b. shipping port.

**Steel Slabs.**—Market remains quiet and unchanged. Bessemer quoted at £4, f.o.b. at shipping point.

**Steel Billets.**—Business slow and sellers' prices unchanged. Bessemer, 2½ x 2½ inches, quoted at £4, f.o.b. shipping point.

**Steel Blooms.**—Very little doing and former prices asked. Makers quote £4 for 7 x 7, f.o.b. shipping point.

**Old Iron Rails.**—Business moderate and at about former prices. Tees quoted

at £2. 7/6 @ £2. 10/ and Double Heads at £2. 10/ @ £2. 12/6, f.o.b.

**Scrap Iron.**—A moderate business and prices barely steady. Heavy Wrought Iron quoted at £2, f.o.b.

**Crop Ends.**—Market remains dull and unchanged. Bessemer quoted at £2. 7/6 @ £2. 10/, f.o.b.

**Manufactured Iron.**—Rather more doing in some departments, but the general market quiet and unchanged. We quote, f.o.b. Liverpool:

	£	s.	d.		£	s.	d.
Staff. Ordinary Marked Bars	8	0	0	@			
" Common " .....	6	5	0	@	6	7	6
Staff. Bl'k Sheet, singles...	7	7	6	@	7	10	0
Welsh Bars (f.o.b. Wales)...	5	7	6	@	5	10	0

**Tin Plate.**—Market quiet at the close, but makers firm on prices. We quote, f.o.b. Liverpool:

IC Charcoal, Alloway grade	13/6 @ 14/0
IC Bessemer Steel, Coke finish	12/0 @ 12/3
IC Siemens	12/3 @ 12/6
IC Coke, B. V. grade 14 x 20	12/0 @ 12/3
Charcoal Terme, Dean grade	13/6 @ 14/0

**Pig Tin.**—The market closed quiet. Straits quoted at £94. 12/6 @ £94. 15/ for spot and £93. 10/ @ £93. 15/ for three months' futures.

**Copper.**—Market closed steady, but quiet. Merchant Bars quoted at £45. 7/6 spot, and £45. 15/ three months' futures. Best selected, £49. 10/ @ £50.

**Lead.**—The market has been steady at about £9. 17/6 for Soft Spanish.

**Spelter.**—Only moderate business, and prices barely steady at £17. 15/ ordinary Silesian.

## The German Iron Trade.

(One mark per metric ton is equivalent to 24.8 cents per gross ton.)

DUSSELDORF, February 25, 1893.

The feeling in the Iron and Steel trade of Germany has grown a shade better. Without a doubt the formation of the Rhenish Westphalian Coal syndicate has had its influence in it. As yet prices have not improved, but a good many orders have been booked at the old prices lately. The makers of Foundry Iron in the Rhenish provinces and Westphalia have decided to arrange for a common selling agency. The quotation for No. 1 Foundry is 62 marks (\$15.37), and for No. 3 Foundry \$13.64.

In the bids made for the Steel Ties for the Government railroads the fact has appeared that a number of works do not belong to the combination, and that they cut under the agreed price very considerably. At present the price of Steel Ties may be quoted at 103 marks (\$25.54). Quite a number of orders for engines, cars and tires are in the market for different Government roads.

The difficulties growing out of the attitude of the Mont Cenis colliery have been overcome and the great Coal syndicate has been formed for five years. This represents one of the great undertakings of modern times, the daily production being not less than 50,000 tons. The board of managers has been elected and is at work in organizing. Until this is completed the collieries may sell direct, a privilege which they are extensively availing themselves of. The majority of them have contracted for their entire production until June of next year, and a good many of them until the close of 1894. Shipments are very active at the present time and reach almost 11,000 10-ton cars per day.

Work is about to be started soon on a very large establishment for the manufacture of cables at Duisburg-Wantheim-erort. The works are to be built for the firm of Basse & Selve of Altena, in Westphalia, in co-operation with English capitalists, the plan being to make the cables by a new method kept strictly secret.

## The Copper Production.

The monthly production of copper in the United States since July has been as follows, the first column giving the aggregate return from the reporting mines, which include the principal lake, Montana and Arizona producers; the second being the metal from pyrites and from a number of smaller outside sources, being estimated:

	Reporting mines. Gross tons.	Outside sources. Gross tons.	Total. Gross tons.
July.....	9,294	924	10,218
August....	10,807	870	11,677
September..	9,710	994	10,704
October....	9,668	1,269	10,937
November..	9,888	1,036	10,924
December..	9,872	1,174	11,046
Total.....			
six months..	59,239	6,287	65,526
January....	9,187	989	10,176
February..	8,213	1,042	9,245

In spite of the short month, the February output is very low. The foreign reporting mines show a production during February of 6762 gross tons, as compared with 5736 gross tons in January. The exports of fine copper were 1815 gross tons in February, against 3171 gross tons in January.

At a meeting of the stockholders of the Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, held there last week, the following Board of Directors was elected: Thomas H. Wells, John C. Wick, Myron C. Wick, Fred. H. Wick, T. F. Woodman, Samuel Mather and Robert Bentley. Owing to the absence of a quorum the directors postponed their organization.

The application of the Illinois Steel Company has been granted to list at the New York Stock Exchange the \$6,200,000 5 per cent. 20-year debenture currency bonds and the \$18,650,600 capital stock. The latter will be listed ex the dividends, payable March 10 and April 1, 1893. The report of A. J. Forbes Leith, member of the Executive Committee, consists of a brief description of the plant of the company, and contains substantially the last annual report, figures of which were published in *The Iron Age* February 16, page 372. In speaking of the Southwest Connellsville Coke Company, which owns 4612 acres of unmined coal and nearly 1000 acres of surface land in the Connellsville region, Mr. Forbes Leith reports that the net earnings of the year 1892 amounted to \$339,428.51, or nearly 8½ per cent. on its capital stock of \$4,000,000. The Illinois Steel Company owns 85 per cent. of the stock of this company, which stands on its books at 60 per cent., while it is believed to be worth par.

A well-attended meeting of the iron trade was held on the morning of March 10, in the committee room of the Chamber of Commerce, to consider and pass appropriate resolutions upon the death of James C. Warr, the prominent iron manufacturer of Wareham, Mass. Josiah E. Bacon called the meeting to order, and Charles E. Brigham was elected chairman, George P. Bullard, secretary. Appropriate and feeling remarks were made by Messrs. Brigham and Bacon, and the following resolutions submitted by Wm. Fox Richardson were passed:

Whereas, Our friend and companion in the iron business, the late James C. Warr, having by Divine Providence been removed from earth to heaven, we, the members of the iron

trade in Boston and vicinity, wish to bear record to his upright business relations and his manly character.

Therefore Resolved, That in a period of years in which we have associated with him in business we have always found him a courteous gentleman and the upright merchant and manufacturer.

Resolved, That a copy of this record be sent to his family.

N. P. Hyndman, Schmidt Building, Pittsburgh, Pa., representative for that city and vicinity of the Hazard Mfg. Company of Wilkesbarre, Pa., has just closed a contract with the Citizens' Traction Company of that city for a new cable 25,800 feet in length by 1½ inches in diameter. This will be the longest cable in use in any of the traction lines in Pittsburgh, weighing about 75,000 pounds and will be furnished on one reel. The Hazard Mfg. Company sometime ago furnished a cable to the Central Traction Company of Pittsburgh for the down-town loop of that line, which has given entire satisfaction. Owing to the many sharp curves in the above line the requirements of their cables are very severe, but the one furnished by the above concern has, as stated above, has given satisfaction in every particular.

Among orders recently received by the Totten & Hogg Iron & Steel Foundry Company of Pittsburgh, Pa., is one from the Minneapolis Rolling Mill for an 18-inch bar train, all complete, with extra rolls for making all sizes of iron used on a train of this kind. A complete 22 inch sheet bar train for the American Tin Plate Company of Ellwood, Ind. An engine for the Licking Rolling Mill Company of Covington, Ky. One of their improved 38-inch roll lathes for the Colorado Fuel & Iron Company, Denver, Col. A 24-foot fly wheel for Pittsburgh parties. A pair of reversing engines for the Midland Steel Company of Muncie, Ind., and two rotary squeezers for Mucie Nail Company, Muncie, Ind.

Shipbuilding on the lakes promises better than for many years, nearly all of the yards having as much as they can do in filling orders for large freight steamers. Two disasters last year, both of which may have been the result of faulty construction, will tend to a closer scrutiny before a vessel is admitted to classification. The Wheelers, at Bay City, are building two steel steamers each 360 feet in length, the largest navigating inland waters, and several other vessels are on the stocks. At Cleveland the Globe Shipbuilding Company are building a number of steamers for freighting purposes, besides two steamers intended to run between Buffalo and Duluth in 50 hours. The Cleveland Shipbuilding Company have ten large steel steamers under construction. The Detroit Dry Dock Company are building a powerful freight steamer, designed to be an ice crusher, and two steamers for freight are in the yards of the Chicago Shipbuilding Company. The Union Dry Dock Company, at Buffalo, are building another, besides tugs and vessels of a smaller description. Freight rates, where vessels of large capacity are employed, are yielding a good return on the investment.

A 200-foot stack is to be built at the Ensley plant of the Tennessee Coal, Iron & Railroad Company, the height of the old stack having proved quite inadequate.

Isaac Bradley has resigned the position of general superintendent of D. M. Osborne & Co.'s agricultural implement manufactory at Auburn, N. Y. Mr. Bradley assumed his position with the firm last August, having come from a large New England manufactory. Henry Koster, who for so many years previous to Mr. Bradley's engagement acted as superintendent, will take charge of the works for the remainder of the season.

# HARDWARE.

## Condition of Trade.

**T**HE HARDWARE MARKET throughout the country is characterized by a fair activity, and in some sections the demand is exceptionally good. Trade has to a certain extent been held back in some parts of the country by floods and severe weather, which have had the effect of considerably diminishing the activity. All the indications point to an excellent demand as the season advances, with the prospect of a large trade during the next few months. In some lines, such as Nails and Barb Wire, there is an improvement in the tone of prices, and in some other goods also there is a reaction from extremely low quotations. Shelf Hardware in general remains without important change, except in a few lines, to which reference is made below. The most important advances which have taken place are in Augers and Bits and Jack Chain. The new Cut-Nail card is in general use, and while, on the whole, meeting with approval is criticised by many in the trade. The feeling in regard to this is reflected in the correspondence published on another page. Manufacturers as a rule are well occupied on orders, and in some lines there is difficulty in obtaining goods as fast as called for by the trade. With this heavy demand it is matter of surprise that more strength is not shown in prices, for in some lines, where manufacturers are more or less behind their orders, prices are low and demoralized. Some difficulty is experienced in collections, which are especially slow in some sections.

### Chicago.

(By Telegraph.)

Heavy hardware is in much better demand, and consumers of all kinds are ordering liberally. The city trade has picked up considerably of late, while Nail orders from the country are much in excess of what they were two or three weeks since. The demand for Bar Iron and Steel from stock is especially large, and stocks have to be frequently replenished.

Shelf Hardware has also improved, but the volume of trade in this line is still below what it should be for March.

The country roads are now in extremely bad condition through the West, mud blockades being reported from nearly every quarter. Inundations in Western rivers and ice gorges are seriously interfering with operations of railroads further West, and thus restrict trade below its seasonable proportions. Jobbers here are looking forward to an exceedingly good trade this summer, as foreshadowed by

advices from their traveling men. Merchants all over the West expect to visit the World's Fair this summer, and will defer heavy purchases as much as possible until they can attend to their trade here in person.

The Brass houses report an unusually heavy demand. The managers in some cases say they were never before so busy as they are now. Prices on Brass goods are somewhat stiffer on large quantities, but the advance has not yet affected smaller lots. Collections have not improved, and the financial outlook, therefore, continues rather discouraging.

### St. Louis.

(By Telegraph.)

Orders for spring stocks are rushing in and jobbers have their hands full. Shelf goods are in excellent demand, and a large trade is reported in Agricultural Goods, Pumps, Cheap Locks, Building Hardware, &c. In Wire Nails and Barb Wire jobbers report a heavy trade, and also state that Cut Nails are moving quite freely. The month of March is proving to be almost as active as February, and indications point to a liberal increase in business in comparison with the corresponding period of last year. The Cut-Nail list is meeting with some adverse criticism, but, on the whole, is considered an improvement.

### Philadelphia.

**SUPPLEE HARDWARE COMPANY.**—Trade continues active, notwithstanding the disadvantages the interior towns are still laboring under—viz., inaccessibility from bad roads, which in some sections seem almost bottomless. The severe snows, carried away by the recent warm rains, have caused considerable anxiety in certain sections.

The trade, however, report an encouraging outlook, and are preparing themselves with goods in anticipation of good trade as soon as the customers are able to take goods to their farms.

In the Iron districts there is somewhat of a depressed feeling, owing to the recent failures, which have thrown quite a number of men out of work in that industry. The result of the present low-ruling prices, which necessitates that branch of industry keeping their works running without any profit is realized in bank and other financial circles quite as vividly as inside the office doors of these institutions, and, with the present monetary conditions, there is naturally difficulty in obtaining requisite funds without gilt-edge collateral.

There is evidence, however, of some improvement in prices, which have shown themselves in Barb Wire and Wire Nails, and the indifference shown by manufacturers to take orders even at present prices.

The advance in prices of Auger Bits and Augers, Brass and Iron Jack Chain, and an occasional other article in the

Hardware line, is nothing more than indicated in our former letters.

Collections may be considered below the average at this time, which is naturally accounted for by the conditions of the country as given above.

Bank rates are ruling high in our city and paper is scrutinized carefully.

### Portland, Ore.

**CORBETT, FAILING & ROBERTSON.**—Since our last there has been quite a decided improvement in the way of trade. The weather has been in our favor, and while in some localities the trade is slow in taking hold or placing orders, in others there is more confidence. Not for years has there been such a complaint as to close money, particularly in eastern Washington. It has come to our notice lately that several firms are paying as high as 15 per cent. for money at their local banks, one owing as much as \$30,000. Whether the profit on goods sold is in proportion to the high rates of interest is a question.

The Hardware trade are still shipping via Cape Horn, as the rates made by railroad are not satisfactory on goods where shipment originates near seaboard. Prices still continue to settle to a lower level, and will likely hold there during the present year, owing to large stocks at this point and a determination to hold our trade as against outside competition.

### Baltimore.

**CARLIN & FULTON.**—The activity or depression of the Hardware business depends so greatly upon the conditions of the weather that the state of trade can be almost studied from the bulletins of Old Probabilities, and the records of storm areas and cyclonic disturbances also mean interference with business, with traveling, and with transportation, too.

Outdoor work of all kinds has been almost suspended, and the cessation of farm work, of railroad construction and house building, on account of the elements, has in no way helped trade, but we are still hoping for brighter skies, and with them that improvement in business which will undoubtedly follow.

As contrasted with former years, it is noticeable that the number of buyers from the far-off markets who visit the North and East in the spring of the year is growing less continually, and, in fact, the majority of buyers throughout the entire country now rely upon the traveling salesman instead of going themselves to the large cities to make their selections, examine stocks and make the acquaintances of the principals with whom they deal.

We think this is an error on the part of the average retail merchant, for while it is of course not necessary for him to leave his own home and take a long trip every time he wishes to purchase a little lot of goods, it is undoubtedly beneficial to him to learn by personal observation and comparison the great variety of pat-

terns, of qualities, of new things which no catalogue can do justice to, and which are best seen in the large warehouses in the great cities with which he deals.

Frequently the shrewd buyer in a large market gets ideas, meets with bargains and makes valuable acquaintances which he would never have the opportunity of doing by not stirring from his own door-sill.

Notwithstanding all the disadvantages under which business has been done for the last few weeks, we think the experience of all is that the sales aggregate as much for the month as during the same time last year, and with the advancing prices in some of the strictly seasonable goods we have an undoubted belief in an increased trade during the balance of the spring.

Collections very recently have not been as good as we would like to see them; but, as in one section the oyster industries were completely at a stand still for nearly two months on account of the ice, and in all other sections the farmer has found it impossible to market his produce, we are not surprised at the inability of the retail dealer to collect what is due him.

#### New Orleans.

A. BALDWIN & Co.—Business still continues very fair in this section, with a considerably increased demand for Shelf Hardware and a very lively movement in Steel Nails since the new Nail card has been settled. Bright, sunshiny weather seems to have infused new life into the planters, and the demand for Agricultural Implements still shows a very healthy movement. Inquiries for seasonable goods are coming in freely. The steady improvement in building trade centers in the city of New Orleans has caused an increased demand for Builders' Hardware in all lines.

#### St. Paul.

FARWELL, OZMUN, KIRK & Co.—We are compelled to report a quiet trade thus far for March, considerably less in volume than for the same period in '92, though not any more so than careful, observant business men have foreseen; nor is it any more so than they are entirely willing to see at present, taking into account the disturbed condition of financial matters and the desirability, for general and local reasons, of curtailing rather than extending lines of credit.

The weather has been unfavorable for trade, the country roads being at the worst of the season. From now until the end of the seeding season—60 days—business will be greatly hindered, first, by the weather necessarily incident to the breaking up of winter and then by the great press of farm work in getting in crops, to which everything but sickness and death must yield. Of course there will be considerable trade all along, but it cannot be large or uniform until we settle down to it without disturbance in early May.

All business men are anxious to see the financial situation improved. The general belief is that it will be so after, perhaps, some time of stringency and clearing up. There is certainly nothing in the general condition of business in the country to justify any serious disturbance. The legitimate business of the country is,

without question, in good shape, and if only speculation can be held in check, whether on the bull or the bear side, and if in addition the financial policy of the new Administration shall be wise, there is nothing to be feared. It is a just cause of great surprise to many business men that nothing was done in the last Congress toward stopping the large purchase of silver by the Government. It is a source of wonder that our best informed public men, supported and urged by the financial interests of the country, have not taken decided action on this most important question, and it is greatly to be regretted that the present policy in the purchase of Silver must be maintained until next December, unless an extra session of Congress shall be called. There is no doubt in the minds of the great bulk of conservative business men as to the evils that the business interests of the country are suffering from the unwise legislation on silver now in force, and that there can be no permanent relief until it is vitally changed.

#### Boston.

BIGELOW & DOWSE.—Deep snow and disagreeable weather have had a depressing influence on trade for the past 30 days. Customers complain of a difficulty in making collections, which is easily accounted for by the deplorable condition of the country roads. Heavy rains for the past few days have reduced the volume of snow and bright warm weather will soon give everything a better outlook.

The orders for seasonable goods have been large and are now being shipped. All the manufacturers of Bicycles are behind on their orders and customers are complaining of late deliveries. The roads will soon be in good condition and with the prospect for an early spring, the sale bids fair to be exceptionally large. The Bicycle business will be done more largely by the Hardware dealers this year than ever before.

In general Hardware we note the advance in price of Sisal Rope and Lath Yarn, also the marked advance on Augers and Bits. Jack Chain is being sold on the new list and at the advanced price. The sale of Nails both Wire and Cut is very light.

#### Omaha.

LEE-CLARKE-ANDRESEN HARDWARE COMPANY.—There is now a fair prospect of an early spring, and if the present weather continues a little longer it will lead to active preparations for outdoor work of all kinds, and give an opportunity for the development of extensive local public improvements, for which plans have been made for some time.

The general business conditions of this section of the country at present are on the whole very satisfactory, and it is gratifying to observe that the change of administration seems to have had a reassuring effect in financial circles. Certainly, so far as the conditions of prosperity are concerned, they are everywhere present, and the opportunities for profitable investments are steadily increasing.

All kinds of country produce and live stock are bringing good prices, which

would seem to indicate that the circulating medium is in adequate supply.

Considering the condition of the country roads usual at this season of the year, and the turning point of the season from winter to spring, the general volume of business is satisfactory, with a prospect of a decided increase before the month closes.

#### Louisville.

W. B. BELKNAP & Co.—We are enjoying a fine stretch of bright spring weather, a most grateful relief from the extreme cold and threatening floods. Business is very active in all lines, and the only wonder is that prices are not better. Manufacturers seem to be fairly confused with the quantities of orders on their books, and the printed promises of prompt shipment, such as appear on formal acknowledgments, have come to mean nothing. The readiness with which the capacity of manufacturing plants is increased by the gearing on of a few more machines (the temptation to make this increase is apparently irresistible when business is at all brisk), we presume, is responsible for the continuation of extremely low prices. The future promises an abundance in every way, but it is difficult to secure many seasonable articles for immediate delivery.

Barbed Wire is scarce and \$2 to \$3 a ton higher. Plain Wire is in very active demand and somewhat higher. Trace Chains, Barrows and Wire Cloth are in short supply.

The collapse of Reading and Sugar Trusts on the New York Stock Exchange, and fabulous rates of interest, do not seem to affect business out this way in the slightest. We are a great nation of consumers, able to buy for our wants, and it does not look to us as though the demand would ever be less than it is now.

The railroads are still behind in their handling of business, so much so that we are agreeably surprised when a mail arrives on schedule time. The time made by freight from even leading points continues most discreditable. The L. & N. R. R. has just placed an order for 1500 freight cars.

#### Cleveland.

THE W. BINGHAM Co.—March has not started in with the brisk trade that was anticipated, although we are having beautiful weather at this writing, and everything points toward a good spring's business. We think the balance of the month will show a rapidly increasing trade. The tendency to cut prices, which usually shows itself at this season of the year, particularly when trade has a leaning toward backwardness, is quite apparent in many lines, but we think will right itself as soon as trade becomes good. Stocks throughout the country are light, and there is no reason in the world why a large amount of business should not be done at remunerative prices. The new Cut-Nail card has been adopted by all the manufacturers here, and is looked upon with approval. Wire Nails are firm at advanced prices, and Fence Wire of all kinds is in good demand, with a tendency toward firmness. The money market is still tight and collections are only fair.









## THE Hardware Club OF NEW YORK.

**T**HE FOLLOWING gentlemen, having made application for membership in the Hardware Club, were elected at a meeting of the governors held last Friday:

OLNEY ARNOLD, II,  
American Screw Co.,  
Providence, R. I.

WILLIAM C. BANNING,  
Banning, Bissell & Co., New York.

PHILIP CARPENTER,  
38 Park Row, New York.

THADDEUS B. EIKER,  
50 Tribune Building, New York.

LEON J. GLAENZER,  
82 Chambers street, New York.

WILLIAM P. HAMILTON,  
126 and 128 Duane street,  
New York.

W. J. HENLEY,  
20 Warren street, New York.

WILLIAM HOLROYD,  
Holroyd & Co., Waterford, N. Y.

W. J. KINGSLAND,  
56 New street, New York.

MORITZ KIRCHBERGER,  
45 College Place, New York.

CHAS. W. LAWRENCE,  
R. S. Gould Co., 261 and 263 Canal  
street, New York.

HENRY M. LYON,  
Sickles, Sweet & Lyon, New York.

D. B. McILVAINE,  
111 Chambers street, New York.

ELLIS H. MASTERS,  
The Tribune, New York.

W. H. QUINN,  
103 Chambers street, New York.

A. FRANK RICHARDSON,  
Tribune Building, New York.

E. POPE SAMPSON,  
58 Reade street, New York.

HENRY L. SHIPPY,  
John A. Roebling's Sons' Co.,  
New York.

GEORGE S. SMALL,  
Atlantic Dynamite Co., New York.

MAURICE STRANSKY,  
27 Murray street, New York.

WALTER J. TRAVIS,  
McLean Bros. & Rigg, New York.

GEORGE F. TROWBRIDGE,  
22 State street, New York.

EDGAR UNDERHILL,  
Underhill, Clinch & Co., New York.

OLIVER CHAUNCEY WELLS,  
78 John street, New York.

The annual meeting of the club will be held on Saturday, March 18, at 3 p.m., in the parlors of the Cosmopolitan Hotel, corner Chambers street and West Broadway, when 15 governors will be elected and such other business transacted as may be brought before the meeting. A large attendance of members is desirable.

W. H. QUINN & Co. have recently been appointed managers for the National Manufacturing Company of Boston and Worcester, Mass., for the handling of their standard wire goods in New York City only, with headquarters at the old location, 45 Cliff street. This is in addition to the numerous other lines handled by them.

## Trade Items.

C. E. WOODRUFF, 235 Lake street, Chicago, has succeeded the Globe Supply Company of that city and will continue to represent the Globe Rubber Company of Trenton, N. J., and the Bradford Belting Company of Cincinnati, Ohio, besides carrying in stock a full line of engineering, railroad and milling supplies. His arrangements cover one of the most complete depots in this line in Chicago, and his extended acquaintance in Western business circles will doubtless secure a fair share of this special trade.

THE HARDWARE FIRM of Smith & Lynch, Littleton, N. H., has been dissolved by mutual consent. The interest of Mr. Smith has been purchased by M. H. Richardson, and the business will hereafter be conducted under the style of Lynch & Richardson.

W. H. MASON, for some time with Peck, Stow & Wilcox Company in New York, as bookkeeper and cashier, but for the last few years with some of the various Edison corporations now at 42-44 Broad street, has established himself as an accountant at 33 Broad street, New York, and will be pleased to receive commissions at reasonable figures for writing up books, opening new sets and closing old ones, making out trial balances and statements of all kinds periodically at regular monthly rates, referring, by permission, to officers of the electric companies with which he has been connected.

THE HARDWARE FIRM of Budd & Montgomery of Fayette, Iowa, composed of J. E. Budd, T. L. Montgomery and R. T. Latimer, were dissolved by mutual consent, on the 7th inst. They were succeeded by Montgomery & Latimer, who will continue at the same place of business.

C. F. GUYON COMPANY, 99 Reade street, New York, have been appointed agents for the sale of the Raymond Bicycle in this city and vicinity, and will carry the machines in stock. We are advised that in a recent competition for the patronage of the Rockaway Bicycle Club of Rockaway Beach, L. I., this machine received 17 in a total of 19 votes, and that the Guyon Company sold the members 23 machines. This concern have also been made agents for the sale of Door and other Bells made by the Hardware Specialty Company of Newark, N. J., and will carry a large stock of all their goods.

C. A. HAMILTON, president of the Rogers & Hamilton Company of Waterbury, Conn., also treasurer of the Bridgeport Brass Company, sailed on the steamer "Trinidad" March 9, for Bermuda, for rest and recreation, accompanied by his family. Mr. Hamilton recently returned from Chicago, where he closed a large contract for Silver Ware with the Wellington Catering Company, who will run all the restaurants on the Exposition grounds.

SCHWABACHER BROS. & Co., Incorporated, Seattle, Wash., wholesale dealers in Hardware, groceries, &c., have decided to separate the grocery from the Hardware business, and, while the former will be continued under the above firm name, the Hardware department will hereafter be carried on under the name of the Schwabacher Hardware Company. The Schwabacher Hardware Company have been incorporated with a capital stock of \$200,000, divided into 500 shares of \$400 each. The incorporators are Sigmund Schwabacher, Louis Schwabacher, Bailey Getzert, E. C. Neufelder, Sigismund Aronson, J. S. Goldsmith, S. B. Hicks and Arthur Morton. The company are erecting a six-story building, which upon completion will be occupied exclusively by them.

NOTICE is given that the partnership heretofore existing between John Waelidin and James Whitaker, under the firm name of Waelidin & Whitaker, dealers in

Hardware, Johnstown, Pa., was dissolved by mutual consent on March 4, James Whitaker retiring. Mr. Waelidin will continue the business at the old stand.

THE AMERICAN BIT-BRACE & TOOL COMPANY, Buffalo, N. Y., suggest in a circular letter to the trade the desirability of having their Braces advertised in the local dailies, arranging with customers to call attention to their wares, occupying a portion of their advertising space once or twice a week. The company state their line of Braces include 19 different styles or numbers, several of which are in sizes ranging from 6 to 14 inches, others from 8 to 14 inches and their lowest grades from 8 to 12 inches.

FRANK RICKER, 69 Warren street, New York, is making a specialty of One Minute and The Boss Coffee and Tea Pots and Urns. These are designed to be used with pulverized coffee or tea, and it is claimed effects a large saving in the quantity used while producing superior results.

THE ROGERS & HAMILTON COMPANY, Waterbury, Conn., have just closed a large contract for the silver-plated ware to be used by the Wellington Catering Company, who have undertaken to run the restaurants on the grounds of the Columbian Exposition at Chicago. The Catering Company, it is said, will be prepared to supply food daily to 100,000 people, which will give some idea of the amount of Silver Ware required. There is a total of about 1½ miles of lunch counter. Two classes of goods have been contracted for. In the regular restaurants the new design shell-pattern just introduced by the Rogers & Hamilton Company—and not yet in the hands of the trade—will be used. For the grand banqueting hall, in the Administration building, where will be received the leading dignitaries of this and foreign countries, and where the principal banquets will be held, a complete service of the Crown Hamilton ware has been ordered.

THE BRONSON SUPPLY COMPANY have recently increased their staff, enlarged their showrooms and offices at 72 Beekman street, New York, and materially increased their storage accommodations to enable them to meet the demand for a larger stock in New York of the various factories whose output they control. In addition to their factory at Cleveland, Ohio, for the manufacture of their Never-Break ware, the Bronson Supply Company have assumed the entire output and sale of the following manufacturers: Eustis Mfg. Company, Bayonne, N. J., Puritan Ware; M. F. Koenig & Co., Hazleton, Pa., Excelsior Baking and Roasting Pans; Fillgrove Bros. & Co., Ironton, Ohio, Drip Pans, and the products of the Bellaire Stamping Company of Harvey, Ill., for the eastern half of the United States. The line of Puritan Ware includes Cereal, Fruit and Vegetable Cookers, Chafing Dishes, Five o'Clock Tea Kettles, Multiple Cookers, Egg Poachers, Baking Dishes, Coffee Pots, Universal Measures, &c.

The American Axe & Tool Company have rebuilt the grinding and polishing departments of the Axe and Scythe shops at Ballston Spa, destroyed by fire last October, and started again full blast. They have increased the capacity for turning out work and announce that hereafter there will be less delay in filling orders for Blood's Axes, Hatchets, &c. They refer to orders for Axes in hand as being very largely in excess of what they were at this time a year ago. They have also increased the producing power of several of their factories to meet the larger demand.

In the courts at Youngstown, Ohio, last week an order was made permitting W. C. Hine, receiver of the Youngstown Stamping Company, to operate the works of that concern for the benefit of the creditors.

## Letters from the Trade in Regard to the New Cut-Nail Card.

WE GIVE BELOW further extracts from letters received from representative Hardware houses, both wholesale and retail, referring to the adoption by the Cut-Nail manufacturers of the Wire-Nail card, with the modifications to which we have already referred. These letters, together with those published in our last issue, fairly reflect the opinion of the trade at large, and it will be seen that there is a general disposition to regard the new card with favor as simplifying the purchase of Nails and to a certain extent doing away with the annoyance of having to regard averages, as heretofore. It will be observed that some of our correspondents refer to the fact that it would be desirable if the card for both Cut and Wire Nails were evenly graded, as we suggested in our last issue, so as to do away with the necessity of scrutinizing assortments. Other correspondents also indicate that their approval of the new card is dependent on the manufacturers being able to adhere to their resolution to sell from it without regard to average, some of them expressing doubt as to whether in practice under the stress of active competition this will be found feasible.

The difficulties connected with the use of a card which would be evenly graded so as to dispense altogether with the necessity for considering an average are referred to in the following communication from a prominent Cut-Nail manufacturer:

Referring to the interest that has lately been manifested in the Cut-Nail schedule of extras through the columns of your paper, and the comments that have been brought out by the recent changes in same, permit me to say, in starting out, that the manufacturers are in such a condition that they will sing any song that will be agreeable to the Hardware ear, if they can know just what tune will suit. The trouble about the whole matter is that there are too many who are calling for different tunes at the same time. "Some want their bean porridge hot, some want it cold, and some want it in the pot, nine days old." Thus it happens that in trying to satisfy every one interested, we involve ourselves in endless confusion and catch it from all quarters. The Hardware trade in their efforts to solve this problem, in our judgment, take

### TOO NARROW A VIEW

of the matter involved. They only look far enough to see their own side of the question, and, no doubt, acting on the idea that if they keep ahead they will avoid contact with "the gentleman with the cloven hoof," they insist on telling the

manufacturers how they shall regulate business, fix prices, and what the difference shall be on the various articles which compose the manufacturers' stock in trade. Suppose the manufacturers would reverse this manner and go into the Hardware stores and insist on having a fine razor at a price that would yield to the dealer the same profit on it as he would get from the sale of a Barlow Knife. What would Mr. Dealer say? Would he not say, "No sir! I cannot do that. That Razor has a much larger capital invested in it than the Knife, so I must have a proportionate increase of profit;" and he would be right. We will just change conditions a little and illustrate by introducing

### THE KNIFE AND RAZOR AGAIN.

The dealer has always sold the Knives close to cost, because his trade required them, but he was slow in selling them, and he has accumulated a stock. He is anxious to get them off his hands and says to his customer: "Take these Knives and at the same time take some Razors with them, and we will let you have the Knives below cost;" and he names a price which is an actual loss to him, but he gets his profit on the Razors and gets rid of some undesirable stock, and probably made a little on the whole transaction. If you will place base Nails in place of the Barlow Knives and the fine Nails, or rather the Nails carrying the high extras in the place of the Razors, we will have a parallel case. The different sizes of Cut Nails that the manufacturer makes are his stock in trade; and when he started in business, he put a price on each size that was satisfactory to himself, and this price was adjusted so that a fair profit was realized from the sale of any of the Nails. In those halcyon days the dealer could buy any number of any size and everybody was satisfied, but it was

### TOO GOOD TO LAST.

Competition set in and soon the base Nails were reduced down to cost, but as the custom of taking the same number of cents per keg of each size had become established, there still remained some profit on the estimated cost of the small Nails. About this time some smart Alec discovered that it would be a good thing to work the average by reducing the base Nails below cost and making this loss up by requiring the specifications to be of high average. Well, we know the result of this brilliant discovery. It could not be kept in the dark. One by one we tumbled to the beauties of this plan of selling, and, taking it altogether, I think we have made a pretty mess of it. Base Nails are quoted at very little over the price of slabs, and the kegs that hold them, while Wire Nails, in their eagerness not to be outdone, are, on the base sizes, being sold at less than the cost of rods (the raw material from which they are made).

### BUYERS SEEM TO BE SATISFIED.

After reading the comments of the various writers in the last number (March 9) of your valuable paper I do not see how we can hope to satisfy at the same time so many persons who themselves cannot agree among themselves as to what they want. In the hope of making a card that

would enable the trade to buy such sizes as they would from time to time require, a card was made on January 31, but it was so short-lived, on account of the opposition to it, that it was withdrawn, and now has inscribed over its grave the epitaph on the life of a very young child, "If so soon I am done for, what was I begun for?" We now have the Wire-Nail schedule, and the majority of the buyers seem to be satisfied, so let it stand. The schedule of extras is not too high when taken in connection with

### THE LOW BASE PRICE.

We are willing to admit that it would be better if the base Nails were raised so that they could be sold independent of the smaller Nails, but it would have to be done on the Wire as well as the Cut Nails in order to be satisfactory, and this at present does not seem possible, so let the present schedule stand and give it a fair trial before condemning it. The provision on assorted orders, in order to get the base price quoted, is only a reasonable protection to the manufacturer, and one that any prudent person in business would adopt under the circumstances. It is not really necessary—nor will we insist on it—where it is understood that we furnish all the Nails a jobber or retail dealer needs. We would be willing to agree at this time with any dealer who will take all his Nails (Cut Nails) from us to sell at the straight base price without any other provision except the additional extras, as provided in the schedule, because we know by long experience that at the close of the season our sales will have rounded out to about the common level that has from one season to another been obtained.

The following letters are from representative wholesale and retail merchants whose views are entitled to weight:

ROBERT DONAHUE, Burlington, Ohio.—I think it an improvement, as it simplifies matters in quoting or figuring. Given the base price on either, one can readily and without too much wear of brain tissue arrive at a conclusion. Yet it has occurred to me that the list should be based on the cost of each size. It is self-evident that with Steel Billets as quoted in *The Iron Age* at Wheeling at \$22.15 per ton, a keg of 60 nails cannot be made from the same steel put into kegs and on the market for \$1.25, the rate at which they are quoted, so that this price implies "ordinary specifications." If lists were based on cost of production on raw material it would matter little to the manufacturers whether order for a carload of Nails were all 60 or all 3 fine. However, I think the present card an improvement on any preceding ones.

W. W. WOODRUFF & Co., Knoxville, Tenn.—We think this card is perfectly satisfactory to the jobbers, provided it will do away with the average system. The agitation of this subject, we believe, was first brought about by the Southern Hardware Jobbers' Association, and the object in doing this was to try and prevail upon the Cut-Nail manufacturer to adopt a card that would allow a dealer to buy one car load or ten car loads, as his trade demanded, of Cut Nails at a uniform base price regardless of average. We have

had some correspondence with a few Nail manufacturers since this Nail card has been adopted, and from the tone of the letters received we fear that they have not yet adopted a card that will entirely do away with these evils. The dealers seem to be waiting for a final settlement of the controversy. The main question is whether or not the new card will do away with the average system entirely; if so, we think it will meet with general approval by the trade.

GEORGE BROWN, Knoxville, Tenn.—While it seems to us that this action was imperative upon them, still we regret the fact that it has been necessary to adopt such a card. In our opinion, it can only lead to the greater abuse of the habit of buying by the average, which has been so very unsatisfactory to the jobber. It is a notorious fact that the specifications of the retailer, in the larger towns and cities, because he sells to a class of trade which buys more largely of the fine and small Nails, average much higher than those of the jobber, and as the factories' profits are made off the extras, which are placed by the manufacturers much higher than they should be, he is entitled to and can obtain a lower price than the jobber buying in very much larger quantities. It seems to us that it would only be fair to the trade that the manufacturers of both Wire and Cut Nails should agree on a card which will make an even price to every one, regardless of their specifications.

ROGERS & BALDWIN HARDWARE COMPANY, Springfield, Mo.—We think the use of the same card by Wire and Cut Nail manufacturers will be satisfactory to jobbers. Wire Nails are used almost exclusively in this section, so it matters little to us as compared with localities where demand for both kinds is more equally divided.

S. B. LUTTRELL & Co., Knoxville, Tenn.—We are in favor of adopting the Wire-Nail card for Cut Nails, providing it will do away with the custom of selling Cut Nails on averages above base price. This average advance price is a nuisance. Let it be so we can buy a carload of 60d, or 3d, or assorted, just as we may wish to buy.

CLARK, QUIEN & MORSE, Peoria, Ill.—We do not believe that their action will help the Cut-Nail men a great deal. We may be wrong in our supposition, but we would not like to sell a car of 60d Nails or any large quantities of that size of Nails on a basis of the present price, as applied to the new card, for fear that the manufacturers would turn down our orders when they received specifications. We think that when the Nail manufacturers make a list in which they use an advance for extras about covering the cost of making the extras they will correct the evil of which they complain. As we wrote you before, we have not handled Steel Nails for some time, on account of the matter of averages, and we are very sure this new card will not tempt us to again lay in a stock of that kind of Nails.

A. TREDWAY & SONS HARDWARE COMPANY, Dubuque, Iowa.—We are pleased to take the affirmative side of the matter

and say that it will simplify the Nail extras very much to the jobber, and so long as the Cut-Nail mills are able to sustain such a card without departure from it in any particular, such as insisting upon a certain average above base, or what is equally as disastrous, the making of special net prices on special sizes, we think it will prove generally satisfactory to manufacturers and jobbers as well as retailers, the recent use of conflicting cards having given all experience enough in the difficulty of carrying in mind so various a line of advances above the base prices.

WILLIAM FRANKFURTH HARDWARE COMPANY, Milwaukee, Wis.—We can give no better expression of our idea of the new Cut-Nail card than the one given in *The Iron Age*, March 2, and headed "Cut-Nail Card from the Jobber's Standpoint." We doubt very much that the present Nail card will do away with the average business. This remains to be seen. If it does it is more convenient for the trade to sell Cut and Wire Nails on the same card. Anybody can now readily see that Wire Nails cost him about 25 cents a keg more than Cut Nails.

CHAPIN-WELLS HARDWARE COMPANY, Duluth, Minn.—Our opinion of the adoption of the Wire-Nail card by the Cut-Nail manufacturers is that it is just the thing. In this section of the country it has been very hard for us under the old list to make up a 30-cent average, as we sell mostly of the large sizes. Could we not make up a 30-cent average we would not be able to compete with our competitors, who have better facilities for selling the smaller sizes. Under the new card it places each jobber on an equal basis, and we trust that the average business is a thing of the past.

HOWE & SHIPLEY, LaFayette, Ind.—We think the use of the same card for Wire and Steel Nails would avoid much confusion, and we are heartily in favor of it.

ROBERTS-WILLIS & TAYLOR COMPANY, Sherman, Texas.—We think that the revised card for Cut Nails was a very judicious move on the part of the Cut-Nail people, as it shows at a glance the relation between Wire and Cut Nails. They will have to maintain it irrespective of assortment or it will do no good.

THE W. H. SMITH HARDWARE COMPANY, Parkersburg, W. Va.—It is our opinion that the schedule of prices as arranged on the Wire-Nail card is not properly adjusted for Cut Nails, the advance of medium and small sizes being too great over the base. If a properly arranged card can be adopted by the manufacturers, and the indefinite system of quoting averages done away with, we think it will be a convenience to the trade.

ED. STRAUSS, Waco, Texas.—Given a productive capacity far in excess of present requirements; given a merchant marine inferior to that of other exporting nations; given higher priced raw materials and labor than that of competing nations, a narrow margin of profit or the exchange of an old dollar for a new one, as the saying goes, is the natural result.

Such is the sad fate of the Cut-Nail manufacturer now. All his efforts to bring the business to a profitable basis are in vain as long as such conditions exist. The meeting of manufacturers, resolutions to advance prices and manipulation of the Nail card will not mend matters. A perfect Nail card is one which is based on cost of production. For instance, the advance of a 3d Nail over an 8d should be an equivalent of the difference in cost of manufacture, with this exception: that a Nail which is of rapid and certain sale, like the 8d, should be sold with a smaller margin of profit than a Nail of slow and uncertain sale, like the 3d fine, which requires the same amount of machinery and fixed items of cost as the 8d. I have no data upon which I can form an estimate whether the Wire-Nail card is based on cost of production of the relative sizes, but am inclined to the opinion that the card is somewhat arbitrary. Even if arbitrary, the Cut Nail makers showed their good sense in adopting the same card and doing away with quotations based on average advances. This simplifies matters, so you can see at a glance the relative price of all kinds of Nails, both Cut and Wire. It is but a few years ago when the Iron Cut Nail was all the go. When the Steel Nail arrived, it made short work of the Iron Nail. The latter is now only known in history. As soon as the Iron Nail was driven from the stage of action, the Wire Nail invaded Texas, first as a novelty; now the race between the Steel Cut and Wire Nail is nip and tuck, and in another year the Cut Nail will not be "in it." The principal advantages of the Wire over the Cut Nail are: 1, there are more to the pound; 2, they are freer from dust and faulty Nails; 3, they can be driven faster, as you do not have to look at the grain of the wood. On the other hand, the Cut Nail has a greater holding power than the Wire Nail.

C. S. BROWNELL & Co., Bath, N. Y.—We do not see why it would be any advantage to have a card for Steel and Wire Nails if the extras are not the same. Would prefer Nails rated as before.

LAYMAN & CAREY COMPANY, Indianapolis, Ind.—We believe it to be a move in the right direction, and have always thought that the disparity as to the extras on the Wire-Nail card and the Cut-Nail card was entirely out of proportion, and should not exist, and we look upon this change with favor.

FOSTER, STEVENS & Co., Grand Rapids, Mich.—We think a uniform list and advances that would apply to Wire equally as well as Cut Nails would be found much more convenient than two lists, and would make more easy the pricing in invoices where both kinds appeared.

EMPKIE, SHUGART COMPANY, Council Bluffs, Ia.—We think the Cut Nail manufacturers did a wise act when they adopted the same list as the Wire-Nail men and abolished "the extras," which were an abomination to the trade.

THE KRUSE & BAHLMANN HARDWARE COMPANY, Cincinnati.—We have conformed with the wishes of the manufacturers of Cut Nails and adopted the new



card, and so far have met with satisfactory results and no complaints from the trade. We hope the manufacturers will avoid approaching the trade to purchase on an average, as this will only have a tendency to demoralize prices.

C. W. HACKETT HARDWARE COMPANY, St. Paul, Minn.—We believe that the adoption of the Wire-Nail card by the Cut-Nail manufacturers will result in a loss of trade by the Cut-Nail men. Our experience here is that the Wire Nail has almost driven the Cut Nail out of the market; in fact, last year our sales were only 10 per cent. Cut Nails and the sales were largely in 3d casing and finishing. Now, with the advance made by the adoption of the Wire-Nail card, we fully believe that this is "another Nail in their coffin."

OTT BROS. & Co., Wheeling, W. Va.—We like the new Cut-Nail card very much, though the satisfaction does not extend to the trade, in the beginning at least, as our demand is for large Nails which bring an advanced price. But we are extremely thankful to get away from averages.

THE TABB & JENKINS HARDWARE COMPANY, Baltimore.—In regard to the adoption of the Wire-Nail card by the Cut-Nail manufacturers, we are very much pleased with it indeed, and our opinion is it will be universally adopted, as we can, in few words, quote the price of either Cut or Wire Nails, while, heretofore, we have been obliged to ask our customers for their specifications before giving quotations.

ORGILL BROTHERS & Co., Memphis, Tenn.—We believe the adoption of the Wire Nail card by the Cut-Nail manufacturers will be a benefit to the jobbing trade, inasmuch as it does away with the average nuisance of the old card.

FLETCHER, JENKS & Co., Detroit, Mich.—As soon as the Wire-Nail card was adopted by the Cut-Nail manufacturers we took it up in our business, and up to date we have heard no expressions from our customers in regard to it. So far as we are concerned we do not at the present time see any objection to it.

S. L. WADSWORTH & SON, Eastport, Me.—The new Nail card, in doing away with the average system, will greatly facilitate the making up of orders, and with Cut and Wire Nails commanding the same extras, quotations are made without confusion to customers. The consumer in this section, however, will pay an advance under the present arrangement, as a large proportion of Nails used are small sizes; orders under former system averaging 45 to 55 cents. If, however, the new card has "come to stay," we think it will be a benefit and should be indorsed.

SCHREIBER, CONCHAR & WESTPHAL COMPANY, Dubuque, Ia.—We are in favor of any card on Cut Nails that does away with the necessity of selling or buying Nails based on an average. There has been nothing in the Hardware business that has caused so much annoyance as buying Cut Nails and having to make the specification average a certain amount to secure the bottom price. We cannot

sell Nails on an average; we have to furnish whatever sizes our customers require, and the result has been that we have been loaded up with small Nails, and then have to pay exorbitant prices for the large sizes to make our assortment good. Under the new card we will be able to buy just what our customers call for, and we consider it will be a great advantage, and the new card is perfectly satisfactory to us.

## After Mexican Trade.

SECOND ARTICLE.

BY WM. H. MAHER, TOLEDO, OHIO.

TO THE AMERICAN business man there is something of a shock when he is quietly told on Saturday to come around to the business houses the next morning, and that they open on Sunday as on all other days.

Our Sunday programme started with a call by appointment upon the Governor, General Bernardo Reyes, of the State of Nuevo Leon, of which Monterey is the capital. We found a somewhat plain-looking building for one spoken of as a palace; were conducted through offices where officials and clerks were briskly working, then into an open court (which is a part of all Mexican residences), where were birds, flowers and a fountain, into an elegantly furnished room, where very soon the Governor appeared to greet us. He is a man of between 45 and 50, I should guess; has a nervous, quick manner, but an air of being thoroughly at ease. He welcomed us in Spanish, saying he was gratified that the manufacturers of the United States were enough interested in the Mexican trade to come down there to look after it, and placed his offices at our disposal, saying he would be very glad to furnish us any help or information in his power. We responded in complimentary terms, and took our departure.

The interview lasted 10 or 15 minutes. We were introduced individually to him and were given a cordial hand shake as we passed out. Our way back led by the public market, and we were keenly interested in the pictures to be seen there. Potatoes were spread on the ground in little piles of 1 pound each. Corn was piled in 3-cent piles. Frequently the scales were a home-made affair of a wooden bar, the dishes tied at each end by common twine, but apparently they balanced honestly. The most common articles were little white onions, dark-red beans and pumpkin or squash seeds. Home-made shoes seemed a salable article, and a fair looking pair of women's shoes sold for \$2. Many merchants were dealers in second-hand goods, and among them several who were selling old Hardware. The assortment consisted of old Padlocks, Hasps, Butcher Knives, Hammers, &c. Not a thing in the collection looked to be worth 5 cents, but they wanted 25 cents for almost anything we looked at. Fakirs were selling Pocket Knives on cards, asking 25 to 50 cents for the commonest German Jack Knife, even when it was an old one.

Men and women along the streets were carrying home meat for their Sunday dinners, but no wrapping paper was used by the market men—a loop of string was at-

tached to the piece of meat. The reason for this was that wrapping paper of the commonest kind costs 10 to 12 cents per pound, so people carry home their purchase by a piece of string. It did not add to the appetizing appearance of the dinner to see it carried along the streets in this open manner. It was the season of snow in New York, but it was a Sunday of flowers in Monterey. Growing in the public square, and in blossom, were red and white roses, hollyhocks, flowering maple, phlox, larkspur, and the grass was as green as in June with us.

Passing by the stores, which up to 12 o'clock were in full operation, I saw that Ayer's hair vigor seemed to have a strong hold, judging from the frequent signs displayed in the windows. I wanted a little quinine, and was charged 50 cents for 12 2-grain pills; they sell 100 for 35 cents in our country. Seeing Carter's little liver pills in a case, I learned that the box that sells with us for 20 cents sells for 50 cents here. It costs to be sick in this land of flowers!

Following with my notes of trade, I found that the windmills so plentifully dotting the landscape were from Leffel of Springfield, Ohio, and from the Eclipse Company of the same city.

There were only four large steam boilers in the city, and they came from the United States. There was considerable Barbed Wire in stock—all from St. Louis. The Hardware trade here is drummed regularly by the Simmons Hardware Company of St. Louis, Hibbard, Spencer, Bartlett & Co. of Chicago, and by New Orleans houses. Judging from the brief glance I had, I would say that the last-named city seemed to have the best part of the trade.

The street car lines of Monterey are in the hands of an American, Major Randle. The motive power is mules, and a good one can be bought here for \$30. The drivers are Mexicans, and 62½ cents is good wages per day. Convicts are at work in the streets, repairing and cleaning, with armed guards standing over them.

At the railroad station I learned that coal cost, delivered here, \$13 per ton.

In addition to a cheap German Shear, I found some Seymour Shears in stock, and side by side with very common English Table Cutlery was Cutlery made by the Lamson & Goodnow Mfg. Company.

Sunday afternoon our leaders gave a banquet to us and the prominent Mexican merchants. There were about 20 of them present, and when it was time for toasts and speeches they spoke very cordially of doing business with the United States. They implied, however, that the important point to be considered was the heavy Mexican duty, and that German and English manufacturers bore this in mind, making goods light in weight to reduce the cost, as so many items in the Mexican tariff are figured by weight.

We were requested to visit a smelter upon Monday. Here are my notes of that:

The smelter is owned by Philadelphia capitalists. It has ten furnaces, and the foundation is now laid for an extension of the plant that will double the capacity. Eight hundred men are employed; wages range from 37½ cents to \$3 per day, but the great mass of the men work for very low wages. The products of the smelter



are iron, copper, lead and silver. This is shipped to Newark, N. J. The coal and coke used are largely from Alabama, but coke is also brought from Wales. Soft coal costs \$3.10 per ton laid down on the dock at Tampico; railroad charge to this city is \$3.25. Coke costs \$10 per ton delivered here.

Speaking of the workmen to the superintendent, he said their greatest fault was their irregularity. They were good natured, did anything they were called upon to do, learned quickly, and were good hands, except that when they didn't feel like working they stayed away, and did not seem to consider themselves under any obligation to go to work if they wanted, for any reason, to be idle.

In the office, Culter's desks from Buffalo were in use, and the elevator in the works was made by the Lechtenburg Company of Quincy, Ill.

From the smelter we went to a lager beer brewery, built and owned by Mr. Schneider, formerly from St. Louis. His goods are mostly sent out in bottles. None of these are made in Mexico, though it would seem as if there was a grand opening here for such a factory. As it is, bottles are imported both from the United States and from Germany, but of late German bottles are the cheaper.

Mr. Schneider has a splendid plant, and is increasing its capacity. Something of the bonanza there is in the beer business can be guessed when I inform you that the factory price for bottled beer is \$2 per dozen pints. It retails at 37½ cents per pint, while Milwaukee and St. Louis lager retails here at 50 cents per pint.

Listening to the stories told by various men of our party after they had drummed the trade, I made these notes: The Lynn shoe man said: There is no opening here for me. The demand is for a different shaped shoe than we make. Shoes are given out to be made up at the homes of the work people. A good shoe is sold at \$7 per dozen pairs; has common uppers, good soles, but worth all it costs. The higher priced goods sold here come from France.

The pump man found Goulds' and Rumsey's pumps here, but succeeded in securing a fair order for his goods. The chairman found a fair demand for low-priced goods in his line. The furniture man took an order for a handsome set of parlor furniture. To most of the party there was little encouragement either for the present or the future. The people as a mass are very, very poor. Their purchasing power is limited to the barest necessities of life, and these few things are native products. A few cents' worth of cloth will provide a suit of clothes, with a cheap blanket added. The common people either go barefoot or simply wear a leather sandal, cost 37½ cents per pair. The one point of extravagance is the sombrero—the gorgeous hat. To this ought to be added the perpetual cigarette, used alike by men and women. These are not expensive. 30 for 5 cents, but even 5 cents represents a large part of a man's daily wages, if he is at work.

As I passed by another shop I saw a large amount of Curtice Brothers, canned goods inside, some of Le Page's glue, and a stock of Waltham crayons. The Loco-

motives at the station were Baldwin's manufacture; the cars were made by the Wilmington Car Company.

Monterey has two railroads to the south—the Mexican National, to Mexico City by way of San Luis Potosi, and the other the gulf line to water at Tampico. Monterey is a jobbing town. Proportionately to its size it handles a large amount of goods, and the dealers in the smaller towns for a large region come here to trade, because of its connections with Laredo and Tampico. Large stocks are carried by the Monterey houses. Some of our party came back from visits to the stores with surprise at what they had seen. Many stocks will easily invoice from \$100,000 to \$150,000.

In the old days of our land travel by mules exclusively the dealers insisted upon eight to twelve months' time on all purchases, and foreign markets are quite willing to give this long credit to-day, while the Mexican merchant is not slow in taking all the time that he can get. The American manufacturer is not inclined to sell goods on such long credit as this, but if he expects to get Mexican trade he must do as his competitors in England and Germany are doing.

I made a short call upon the manager of the local branch of the Mexican National Bank. He told me that discount was at the rate of 1 per cent. per month in Monterey. He is also the owner of a cotton mill, and uses American cotton, which was then costing 22½ cents per pound at the factory.

As we turned our backs to Monterey, with our faces towards San Luis Potosi, we could speak of the kindly courtesy of Monterey merchants and officials with sincere thanks. The orders for goods taken away were disappointing. The prospects for future trade in the various lines represented were not very hopeful, but the party had new ideas of the trade of their Southern neighbors, and saw that if they would do more with them they must adapt their goods to that market, and adopt the same business methods of the European manufacturers who now have such large control of the trade.

The local committee sent us to the depot, accompanied by the brass band. Our special train was lying there in wait for us. We parted from those who had been so attentive to us with thanks and regrets, and wondered what was to be found in the city ahead of us.

## Louisville Trade.

(From a Special Correspondent.)

Business in this section grows no smaller, but as balmy weather shows itself occasionally, it causes an expansion of trade. The general Hardware business is lively; no jobber is dissatisfied. Goods are going out faster than they come in. The dealers were not aware of what a big demand was pending, and few of them were prepared with heavy enough stocks. The manufacturers in certain lines did the right thing—advanced prices just enough to give their jobbing customers a reasonable margin and a feeling of assurance. Bar Iron, Barbed Wire, Wire Nails and such leading goods cannot come fast enough from the factories. All lines of Hardware are moving out fast, and particularly Agricultural Implements. To judge from the goods handled, one would wonder what has become of last year's tools. Our jobbers, too, are handling sporting goods much more than ever before.

## Criticisms on the New Cut-Nail Card.

WE HAVE RECENTLY received several letters in which criticisms are expressed on the card now in use for Cut Nails and some of its inequalities are pointed out. One of these letters is from a representative Hardware merchant in the West, whose inquiry we submit to our readers:

It seems to me that the card adopted is altogether impracticable. The objection to the old Nail card has been, that the average of advance had to be ascertained before prices could be quoted—the higher the average the lower the rate—showing that the advances were too high. Now, to equalize this, the advance should have been reduced, and it seems to me that the National card (or list) adopted January 31, 1893, was about right—at any event, it was a move in the right direction. This last card, February 15 and 21, increases the defects of the old card; to show more clearly, take 6d Common Nails, which are medium price, and I think more of them sold than any other number.

Advance on 6d Common Cut Nails:

Old card.	List Jan. 31.	List Feb. 15.
\$0.40	\$0.20	\$0.75

Now, if in practice 40 cents advance was too high, how about an advance of 75 cents? Would like to hear what others have to say about this.

Another correspondent favors us with the results of his figuring and arrives at some interesting results by comparing the average cost of different assortments of Cut Nails; also the cost of fancy Nails on the old and new cards, as follows:

Having a little time one day, between calls, I did a little figuring on the Wire Nail card, as published in *The Iron Age* February 23, to see what advantages would be gained by ordering different assortments of Cut Nails by this card. While the assortment of Nails given would not suit my trade, it answered to arrive at results. As the new card was adopted to do away with figuring on averages—that is, of decreasing the base price in proportion to the advance of the average, I figured on a \$1.25 base price irrespective of the high or low average of the assortment. The price of the 250 kegs of Nails was, of course, the same as given in *The Iron Age*—i. e., \$466.50, as here shown:

No.	Extra.	
3, Fine.....10 kegs	\$1.60 =	\$16.00
4, Flat.....5 "	.90 =	4.50
4, Common..5 "	.90 =	4.50
5, ".....5 "	.90 =	4.50
6, "......25 "	.75 =	18.75
8, "......60 "	.60 =	36.00
10, "......70 "	.50 =	35.00
12, "......30 "	.45 =	13.50
20, "......10 "	.35 =	3.50
40, "......5 "	.25 =	1.25
60, "......5 "	.00 =	0.00
8, Finishing.10 "	.90 =	9.00
10, "......10 "	.75 =	7.50
250 "		\$154.00
250 Kegs at \$1.25.....		\$312.50
		\$466.50

I found that the average cost per keg of the 250 kegs, at \$466.50 for the lot, was \$1.86½. Then from curiosity I divided the sum of extras, \$154, by the number of kegs to find the average, which proved to be 61½ cents.

It is interesting to note that the same assortment of Nails on the old Cut-Nail card was a 35-cent average. Now, I thought if I should sell out my Common Nails and have to replace them to enable me to get rid of the fancy Nails, I would see how much they would cost me all around, and if I would be losing money if I sold my first lot of Common Nails proportionately to their cost, with possibility of my next lot costing me more, so I took out the 3 Fines, 4 Flat, 5 Common and 8 and 10 Finishing. This left me 210 kegs, costing on a \$1.25 base, \$375.

	Kegs.	Extra.	
4, Common	5	\$0.90	\$4.50
6, "	25	.75	18.75
8, "	60	.60	36.00
10, "	70	.50	35.00
12, "	30	.45	13.50
20, "	10	.35	3.50
40, "	5	.25	1.25
60, "	5	.00	0.00
	210		\$112.50
\$2.10 @ \$1.25 base			262.50
			\$375.00

I found that this assortment was about a 53-cent average, and so the order would be accepted, as it averaged 50 cents above the base price. I also found this assortment brought the average cost per keg to \$1.78½, against \$1.86½ as before, so that I could sell them at the same price as I did my first lot and make a larger profit. I came to the conclusion that there were great possibilities in this new card. Of course the last lot of 210 kegs was not up to the usual carload quantity of 250 kegs, but the quantity could be increased by the addition of Common Nails without materially increasing the average price. I also found that while some sizes of the Common Nails cost more on the new than on the old card, some sizes of fancy Nails cost less, as follows:

	Old card.	New card.
3, Fine	\$2.90	\$2.85
8, Finishing	2.40	2.15
10, "	2.25	2.00

This result was reached by taking \$1.40 as a base price on the old card and \$1.25 base price on the new card.

## Morley Brothers.

**A** PORTRAIT of George W. Morley president of Morley Brothers, Saginaw, Mich., together with views of their wholesale and retail establishment, also of factory buildings, are shown in a recent number of the *Northwestern Lumberman*. The business was established, we understand, about 30 years ago, under the firm name of Schmitz & Morley, and was changed in 1864 to Morley Brothers. Their store proper is 90 feet on Washington avenue, 150 feet on Tilden avenue, with a depth of 240 feet. In the different departments of their store and factories nearly 200 men are now employed. The Blue Line lumbering tools manufactured by the firm are favorably known throughout the logging camps of the country, and they also make a large line of Saginaw Harness for lumbering purposes.

In connection with the review of Morley

Brothers' business, the above-mentioned paper gives a table of Hardware prices, comparing the year 1872 with 1892. These prices, it is stated, are of articles used in lumber camps, the figures representing retail prices, as follows:

	1872.	1892.
Single Bit Axes, per box	\$15.00	\$7.00
Double " "	25.00	14.00
Axe Handles, per dozen	5.00	2.50
Cross-Cut Saws, per foot	.70	.35
Saw Handles, per pair	.75	.30
Files, per dozen	4.85	1.50
Chain, per pound	.17½	.05
Swedes Iron, per pound	.11	.04½
Bar Iron (common), per pound	.05 7-10	.02
Sleigh Shoe Steel, per pound	.10	.03
Cast Steel, per pound	.21	.12½
Cut Nails (Iron), per keg	6.00	2.00
Wire Nails (Steel), per keg	8.50	4.50
Horse Shoes, per keg	6.75	3.75
Horse Nails, per box	.22	.14
Manila Rope, per pound	4.50	2.75
Glass, per box	1.60	.75
Augers, each	16.00	10.25
Mattocks, per dozen	14.50	6.50
Shovels, per dozen	15.00	6.00
Lanterns, per dozen	.85	.30
Copper Rivets, per pound	.12	.05
Nuts and Washers, per pound	21.00	6.00
Knives and Forks, per gross	1.75	.30
Tinned Table Spoons, per doz.	1.90	.40
Dish Pans, each	1.65	.60
Tin Plates, per dozen	1.65	.60
Tin Cups, per dozen	20.00	5.00
Boot Calks, per thousand	48 00	20.00
Swamp Hooks, per dozen	30.00	16.00
Cant Hooks, per dozen	60.00	18.00
Peaveys, per dozen		

The price of Cut Nails does not show in the list for 1892, for the reason that none were sold, and, as Wire Nails were not made in 1872, no price of course could be given.

## Export Notes.

**T**HE AMERICAN LAMP & BRASS COMPANY, 96 Church street (lately Swann, Whitehead & Clark), report substantial benefits from some of the reciprocity treaties now in force. More or less they have been exporting decorated and metal Lamps for three or four years, but recently have had increased orders from the West Indies and South American countries. They are continually in receipt of inquiries from widely separated sections, among which may be mentioned, in addition to those named, Mexico, Calcutta and Delhi, in India, South Africa, China and Japan. They have a salesroom in Chicago, and will make an extensive exhibit at the coming Columbian Exposition.

The north jetty of the new harbor works at Tampico is to be extended 1000 feet upon the recommendation of the chief engineer, who gives as his opinion that the completion of the proposed additional work will overcome all obstacles in the way of permanent deep water at that port. The present jetty work is said to have been remarkably successful, causing the business of the port to increase until it now ranks fifth of the 35 ports in Mexico. Customs receipts for January, 1893, at Tampico, were over \$91,000; those at Nueva Laredo, \$145,000; and Vera Cruz \$800,000 for the same month.

To put an end to the confusion which prevails on board steamers arriving at Havana, Cuba, the following regulations have just been promulgated by the captain of the port:

1. It is prohibited to boats of all sorts to come alongside of steamers before those of the Board of Health and the Custom House.

2. As soon as the Board of Health and Custom House officers' visits have been passed the captain of the steamer will lower the ladders on both sides—that at starboard for the family and friends of passengers, and that at larboard for the hotel runners.

3. The mate of any boat contravening above dispositions will pay a fine of \$5 the first time, \$10 the second, and be deprived of his dispatch the third time.

Hugh R. Griffin, London manager of the Walter A. Wood Mowing & Reaping Machine Company, who has been in this country for some weeks, returned to his post March 8, on the steamer "Teutonic."

The policy of President Diaz, recommending to the Mexican Congress that the harbors of the Republic be improved, is to be carried out, a large amount of money having been appropriated for that purpose. The Government dredge boat has arrived at Vera Cruz, and that harbor is to be dredged and otherwise substantially improved. Extensive improvements are already in progress at Mazatlan, on the Pacific Coast, and at Coatzacoalcas on the Atlantic. The completion of the Tehuantepec Isthmus Railroad is expected to make Coatzacoalcas one of the important ports in Mexico.

The work on the great irrigation ditch at Hermosillo, Mexico, has begun, a steam dredge, doing the work of 1000 men, being in operation. In addition a force of 500 Mexicans is employed.

Heywood Bros. & Co. of New York and Gardner, Mass., manufacturers of fine Rattan and Reed Furniture (Chairs, &c.), recently received two very satisfactory orders for these goods to be shipped to the Liverpool connection of Flint & Co., which were alluded to as the best they have had from this source.

The Walter A. Wood Mowing & Reaping Machine Company sent 3000 Harvesters and Binders to the Argentine Republic, through Buenos Ayres connections, for the season of 1892.

The Walter A. Wood Harvester Company of St. Paul, Minn., incorporated a year and a half ago, have about completed the new factories they have been erecting, which will have a capacity of 50,000 Harvesters and 55,000 Mowers a year, besides a full line of analogous goods. This concern will turn out 20,000 Harvesters this year at the old factory in Minneapolis, absorbed by them since the formation of this company. The new plant alluded to is said to be the largest of its kind in the world.

The Howard Thermostat Company, Syracuse, N. Y., W. B. Wilkinson, manager in this city, have recently opened a branch at 166 Upper Thames street, London, England, for the purpose of pushing the sale of their Thermostat, which has met with such success in this country. This device is designed for regulating the temperature of buildings at any desired point in connection with house or other furnaces. They have secured letters patent in Great Britain, and the United Kingdom will be thoroughly canvassed,

by travelers and the sale of this article pushed in every way.

## How to Avoid the Accumulation of Dead Stock.

SECOND ARTICLE.

BY H. C. WISEMAN.

**A** COMMON ANSWER would be—get rid of it before it becomes “dead”—which is pretty hard to do as a regular thing.

You have seen the back-number merchant who insists he never had any dead stock, and you see every day the wide-awake merchant, who knows such goods in a larger or smaller degree must be a part of the business. Like any other business disease, it can be gotten rid of, if taken in time, without great loss. Styles change, something else supersedes. The demand falls off, and this is the time to take hold of such goods, if the business eye will only see it.

### KEEPING AFTER IT.

There are merchants who don't want to see it, others will—after stock inventory. The prudent, watchful merchant is on the lookout for it at all times. When looked after but once a year, it is easy to find an accumulation, and one with a value—even as a scrap pile, or old Iron. But it must be gathered together, turned over, assorted, laid out, and made the most of. As the caption of the above is how to avoid, rather than how to get rid of, such accumulations, allow me to suggest again, that any avoidance at all comes only with eternal vigilance, and that future avoiding comes only with previous ridance, and necessarily the two are very closely allied.

### KNOWLEDGE OF STOCK.

We have always made it a point to keep a separate clean-up or bargain counter, taking everything that tends to slow sale, or to depreciation in value, brightening up, remarking, and putting it here, mixing in other goods that will help it off. If one remarking will not do it we give it another.

The largest help in avoiding all accumulation is to know your stock thoroughly, from front door to back. Keep pushing it forward, never hiding it, knowing probable customers who will use such and such lines, and never losing sight of goods or customers.

Broken dozens, single pieces, odd jobs and left overs must be put out, classified and pushed. Clerks must understand when a Sash Lock, Door Bolt or Escuch-eon is called for, not to open full packages, or regular goods, if there is the slightest chance of working off the other. Nine times out of ten they will go at a price, and before you are aware of it that odd stock is gone.

In making stock memoranda, to fill up or purchase for, we make it a rule to watch for goods that are not moving. As a result of such work we are able to pride ourselves on the smallness of these accumulations.

### ATTRACTING ATTENTION.

On the clean-up tables or counters it is always possible to make a fairly good display. In addition, a clever man with a

marking brush will have saved all odd pieces of pasteboard coming in, and will use them for signs to go with the goods. Such as:

### ODDS AND ENDS.

See prices.

### BROKEN STOCK.

Half price.

### JOB LOT.

Was 50¢, now 25¢.

With ordinary care, and the same attention that is given to other detail, it can be kept at a minimum, and need never be a bugbear.

### A PARTICULAR CASE.

As an example of what can be done in getting rid of such goods, we some time ago found a house with nearly 1500 cheap Hatchets, boys' and men's Axes (all ordinary stock for 10 years). We bought them all at half price, and for two weeks filled both large show windows, a counter and racks at the door, in attractive display, with a sign which possibly had two meanings, but which sold the goods, *i. e.*, “They won't last always,” and others much like it. We were able to close out the last one in a little over three weeks. So it is with a general line, if goods are watched, the work put on them, and ordinary business intelligence used, the stock need never quite reach the absolutely “dead” point.

## Prize Competitions

**\$25.00.**

**I**N ORDER to obtain information which will be of practical service to our readers we hereby announce

### Prize Competition No. 16.

SUBJECT:

#### Three or More Rules to be Observed in Buying.

This competition will remain open until April 8, 1893.

Those intending to compete are reminded that it will not be necessary to write long essays, but that comparatively brief and business-like answers will be favorably regarded as meeting the purpose for which these competitions are announced.

The following prizes will be awarded:

First prize .....	\$12.50
Second prize .....	7.50
Third prize .....	5.00

The prizes will be awarded for answers which in the judgment of the committee of award are most suitable for publication and of the most general interest. We reserve the privilege of extending the time on any competition in case the contributions received are not of sufficient number or merit for the committee to award prizes. These competitions are open to every one, and it is hoped that there will be a general response from business men. We shall have the privilege of publishing any or all of the contributions received.

Replies are to be received not later than April 8, 1893. They should be addressed as follows:

**DAVID WILLIAMS,**  
96-102 Reade street,  
New York.

### Prize Competition No. 16.

The committee to whom the contributions in Prize Competition No. 2 were referred have awarded the prizes as follows:

First Prize to M. W. CARLETON, Cleveland, Ohio.

Second Prize to F. F. GILMORE, Louisville, Ky.

Third Prize to WALTER EIKEL, Chihuahua, Mexico.

Other Competitions which have closed are now in the hands of the Committees of Award, who are giving careful attention to the claims of the different contributions. From the number of these and the evident merit of not a few of them, we are assured that a great deal of valuable information and suggestion will be put at the disposal of the trade.

The Weekly Prize Competitions noted below are now before our readers and remain open until the dates named:

### No. 13. Closing March 18.

The Best Method of Changing a Credit into a Cash Business.

### No. 14. Closing March 25.

Suggestions Regarding the Sale of Spring and Summer Goods.

### No. 15. Closing April 1.

Suggestions in Regard to the Sale of Athletic and Sporting Goods.

### No. 16. Closing April 8.

Three or More Rules to be Observed in Buying.

Another subject will be announced in our next issue.

## Screw Manufacture.

**S**OME of the newspaper paragraphs which have recently been current in regard to the American Screw Company and their late annual meeting have a tendency to give an exaggerated impression as to the profit attending the manufacture of this line of goods, and are, in fact, so referred to in some of our exchanges. The numerous failures in this line are naturally lost sight of, but when it is remembered that since the American Screw Company were founded there have been about 100 failures connected with the manufacture of this line of goods, the percentage of success in Screw manufacture will be seen to be smaller than in other staple industries. It should also be borne in mind that a very large capital is requisite for a successful conduct of the business. The American Screw Company's present capital and surplus combined amounts, we are advised, to \$5,831,243, and it is intimated that some good judges claim an additional half million could advantageously be used. The value of the product turned out is relatively small, because of the high quality required in machinery and organization, and many in the trade will doubtless be surprised by the fact that it takes two years for the company to turn their capital. The force of this fact will be appreciated by merchants who are in the habit of turning their capital many times in the year.

## Manufacturing.

Vandegrift Mfg. Company, Shelbyville, Ind., advise that the demand for their Wrenches has been of steady growth—so much so as to necessitate the enlargement of their present works, arrangements for which are now being completed.

The Withington Handle Company have purchased the Handle factory at Huntington, Ind., formerly operated by Allen Bros. The company have been recently incorporated by William H. Withington, Thomas H. Russell and Philip H. Withington, all of Jackson, Mich. William H. Withington and Thomas H. Russell are vice-president and treasurer respectively of the Withington & Cooley Mfg. Company, of Jackson. We are advised that the company will extensively carry on the manufacture of both finished and unfinished farming Tool Handles and other Handles and Wood Shapes. They will be in a position to supply the home and export trade and the manufacturers of farming tools. The officers of the company are as follows: William H. Withington, president; Philip H. Withington, vice-president, and Thomas H. Russell, secretary and treasurer.

The A. L. Swett Iron Works, Medina, N. Y., advise us that their trade during 1892 was 10 per cent. in excess of that in 1891. During the past two years the plant has been nearly doubled in size, and the water power has been increased by building a cut-stone dam, 234 feet long, across the Oak Orchard Creek. Steady employment is given to over 100 men.

Fred. J. Meyers Mfg. Company, Covington, Ky., notwithstanding their disastrous fire recently, have already begun to manufacture seasonable goods pending the re-establishment of their permanent plant, having secured temporary facilities. They announce they have a stock of goods at 69 Beekman street, New York, F. J. Mattison, Eastern agent, where customers can be supplied in a small way until they are in better shape to meet demands. They will rebuild at once.

The Phoenix Knife Company, Phoenix, N. Y., with the recent improvements they have made in their factory are able to make one hundred dozen a day. The company state that their aim is to make first-class goods only, making only just enough of the cheaper goods to fill out an adequate line for their customers. The company advise us that they make to order only for the large trade, not exceeding ten customers, who take their entire product.

After March 22, 1893, the Storm Mfg. Company, makers of Elevators and Dumb Waiters, will be located at their new factory, 161 and 163 Washington street, Newark, N. J.

Toledo Block Works, Toledo, Ohio, state that they are now carrying in stock a line of Tackle Blocks equal to any in the market. They also manufacture all kinds of Architectural Iron Work, such as Sidewalk Lights and Gratings, Iron Fencing and Stairs, Iron Shutters and Doors, Vault Doors and Grates, &c., and are well equipped for work in these lines. A recent purchase of property adjoining their present plant greatly increases their facilities for doing heavy structural iron work.

Matthai, Ingram & Co., Baltimore, manufacturers of Tinware and Sheet-Metal goods, were visited by fire, March 14, causing an estimated loss of \$75,000. The main buildings and storage warehouses were saved. The boiler and engine are intact, the stamped ware, pieced ware, galvanizing, japanning and tin-plate departments are all right, the main trouble being in the retinning department, where the fire started. They expect to be in operation in two or three days. In send-

ing out a circular to the trade announcing the occurrence they ask the indulgence of customers and friends for the slight delay that may ensue in shipping Sheet Iron Ware and retinned goods. They will commence rebuilding at once, and hope to be in full running order in a short time.

## Standard Hardware Lists.\*

THE SECOND EDITION of *The Iron Age* Standard Hardware Lists, revised and enlarged, has been published and contains a number of lists not before issued in this form. The lists are intended to be cut out and inserted in price books and for this purpose are printed on thin and tough paper of the best quality, and on only one side of the paper. The pamphlet includes the following lists:

Auger Bits.	Kettles, Brass.
Augers.	Kettles, Cast Iron.
Bells, Hand.	Kettles, Maslin.
Belting, Leather and Rubber.	Knives, Drawing.
Boilers, Round.	Mattocks.
Bolts, Carriage, Common.	Mowers, Lawn.
Bolts, Carriage, Norway Iron.	Nail Card, Cut.
Bolts, Carriage, Philadelphia Pattern.	Nail Card, Wire.
Bolts, Machine.	Nails, Horseshoe.
Bolts, Plow.	Nails, Miscellaneous.
Bolts, Stove.	Nails, Wire, in Packages.
Bolts, Tire.	Nuts.
Bowls, Scotch and Yankee.	Oilers, Machine.
Brads.	Paper, Sand and Emery.
Butts, Brass.	Picks.
Butts, Cast.	Pipe, Wrought Iron.
Butts, Wrought.	Plane Irons.
Cartridges.	Points, Glaziers', &c.
Casters.	Pots, Cast Iron.
Chains, German.	Pots, Glue.
Chain, Jack.	Rakes, Garden.
Chain, Safety.	Rasps, Horse, &c.
Chisels.	Rings, Trap Door.
Cocks, Brass.	Rivets.
Compasses.	Rivets and Burrs.
Dividers, Wing.	Sauce Pans.
Files.	Screw Drivers.
Freezers, Ice Cream.	Screws, Brass and Bronze.
Gimlets.	Screws, Iron Wood.
Glass, Window.	Screws, Coach or Lag.
Gauges.	Shells.
Griddles.	Slicks, Carpenters'.
Hasps and Staples.	Spiders.
Hinges, Strap and T.	Staples.
Hoes, Eye.	Squares, Iron and Steel.
Hoes, Field, Mortar, &c.	Stocks and Dies.
Hoes, Planters' and Cotton.	Tacks.
Hollow Ware, Stove.	Tacks, Carpet.
Hooks, Awning.	Trimmers, Bent and Straight.
Hooks, S.	Vises, Solid Box.
Hooks and Staples.	Washers.
Iron List, Eastern.	Wire.
Iron List, Western.	Wire Goods, Bright.
	Wrenches.

The former edition was received with so much favor by the trade that it manifestly met a want, and our advices from Hardwaremen indicate that these lists have been found exceedingly convenient for the purpose for which they are intended. The labor of writing list prices in price-books and the amount of space occupied have deterred many from keeping price books as thoroughly and systematically as is desirable, and it has been found that lists taken from printed catalogues are not usually sufficiently compact

\* Published by David Williams, 96-102 Reade street, New York. Price 25 cents.

in form to make them suitable for this use. It may also be said that the lists issued by manufacturers and jobbers are not infrequently incorrect, and in the compilation of these lists especial care has been taken to give the standard list prices representing the best usage of the trade. The lists comprised in this collection have been prepared with especial view to compactness of arrangement and convenience of reference, the aim being to present each list in the smallest space consistent with clearness and convenience of use. As will be seen from the group of lists given on another page, no effort has been made to give the lists in a uniform size or shape, but simply in such a way as will make them occupy as little room as possible in the price book. The precise manner in which this is done must obviously be left to the merchants, who will adopt such methods as are most consistent with their views, the size and character of the price book kept, &c. Some of the small lists, as, for example, GARDEN RAKES or GIMLETS, will most appropriately be gummed on some vacant space on the page where the prices of these goods are kept; but some of the larger lists, as, for example, FILES, BRASS COCKS, MISCELLANEOUS NAILS, BRADS, &c., may conveniently be inserted as a separate leaf between the pages of the book. Some of the lists are given in more than one arrangement, thus permitting a choice of such form as is best adapted to the use to which it is put, as, for example, the cards for Cut and Wire Nails, which are printed in two forms, one of which would run up and down the page and the other across the page. Some of the lists may be cut down so as to show only the goods which are carried in stock, or on which the merchant cares to keep prices, and room can thus be economized. These lists have been prepared with great care to insure their correctness, and it is believed that they will be found a convenience to merchants for the purpose intended. As a compact and convenient collection of standard lists covering a large variety of goods they will also be of service for reference in the form in which they are presented.

## The Holding Power of Nails.

RELATING to the tests as to the relative holding power of Cut and Wire Nails, we have the following communication from a correspondent in Indiana, who alludes to the effect of time on the holding power of Wire Nails:

In regard to the tests to be made as to the holding power of Cut and Wire Nails, I wish to say that to make the tests of any value or significance, the work after being nailed should be allowed to stand for a week or two and the nails then drawn. It has been my experience that cases nailed with Cut Nails are easier to open with a nail puller than the same cases in which Steel Nails have been used. The Cut Nail after starting comes out easy, whereas the Wire Nail holds its full length. Carpenters also say that in taking off shingle roofs that have been nailed with Wire Nails the shingles break and the nails all remain in the sheathing.

## Brass Cocks, (HARDWARE GOODS.)

Inch.....	1/4	5-16	3/8	7-16	1/2	9-16	5/8	3/4	1	1 1/4	1 1/2
<b>Racking.</b>											
Fast Key, Drive..	\$5.00	6.00	7.50	9.00	10.00	12.50	14.50	17.00	23.00	30.00	.....
Fast Key, Screw..	5.50	6.50	8.00	10.00	11.00	14.00	16.00	19.00	25.00	32.50	.....
Loose Key, Drive	6.50	.....	8.50	10.00	12.00	.....	16.50	20.00	27.00	35.00	.....
Loose Key, Screw	7.00	.....	9.00	11.00	13.00	.....	18.00	22.00	30.00	37.50	.....
<b>Globe, T Handle.</b>											
Tinned Shank....	8.00	.....	10.00	.....	13.50	.....	16.00	22.00	.....	.....	.....
Screw Shank....	8.50	.....	10.50	.....	14.50	.....	17.50	24.00	.....	.....	.....
<b>Globe, Lever Handle.</b>											
Tinned Shank....	9.00	.....	11.00	.....	14.50	.....	18.00	24.00	.....	.....	.....
Screw Shank....	9.50	.....	11.50	.....	15.50	.....	19.50	26.00	.....	.....	.....
<b>Plain Bibbs, Tinned Shank.</b>											
Rough.....	9.00	.....	11.00	.....	14.00	.....	16.00	21.00	.....	32.00	52.00 72.00
Finished Brass ..	10.00	.....	12.00	.....	15.00	.....	18.00	24.00	.....	36.00	60.00 84.00
Nickel Plated....	12.00	.....	14.00	.....	17.50	.....	20.50	26.50	.....	39.00	.....
Silver Plated....	17.00	.....	20.00	.....	24.00	.....	30.00	39.00	.....	62.00	.....
<b>Plain Bibbs, Screw Shank.</b>											
Finished Brass ..	11.00	.....	13.50	.....	17.00	.....	20.00	27.00	.....	41.00	68.00 94.00
Nickel Plated....	13.00	.....	15.50	.....	19.50	.....	22.50	29.50	.....	44.00	.....
Silver Plated....	18.00	.....	21.50	.....	26.00	.....	32.00	42.00	.....	67.00	.....
<b>Petroleum Faucets, Screw or Tinned Shank.</b>											
Lever Handle....	.....	.....	6.75	.....	8.25	.....	9.00	10.50	.....	12.00	.....
T Handle.....	.....	.....	6.00	.....	7.50	.....	.....	.....	.....	.....	.....

## Brass Shells.

<b>First Quality.</b>	
Gauge Length. Per 100	
8 3/8 to 3 1/2 in..	\$20.00
8 3 in. or under	18.00
10 2 3/4 to 3 1/4 in..	10.50
10 2 1/2 in. ....	10.00
12 2 3/4 to 3 1/4 in..	10.50
12 2 1/2 and 2 3/8 in.	10.00
14 2 3/8 in. ....	10.00
16 2 1/2 in. ....	10.00
20 2 9-16 in. ....	10.00
<b>Second Quality.</b>	
10 2 3/8 to 2 1/2 in..	8.00
12 2 1/2 to 2 3/4 in..	8.00

## Strap and T. Hinges.

Inches.....	3	4	5	6	7	8	10	12	14	16	18
Light strap.....	\$0.50	0.65	0.75	0.95	1.20	1.35	1.90	3.25	4.00	5.00	.....
Heavy strap.....	.80	1.00	.07 1/2	.07 1/2	.06 1/2	.06 1/2	.06 1/2	.06 1/2	.06 1/2	.06 1/2	.....
Light T.....	.60	.65	.75	.90	.....	1.10	1.40	2.10	3.00	.....	.....
Heavy T.....	.80	.90	1.00	.....	1.35	1.90	3.00	4.00	4.50	\$5.00	.....
Extra heavy T.....	.....	1.35	.08	.....	.07 1/2	.07	.07	.07	.07	.....	.....
Long chest.....	.....	.....	.90	.....	1.10	1.40	1.75	.....	.....	.....	.....
<b>Corrugated steel:</b>											
Heavy strap.....	.....	.80	1.00	1.50	.....	2.30	3.45	.....	.....	.....	.....
Ex. heavy T.....	.....	.....	1.35	1.70	.....	2.80	3.80	.....	.....	.....	.....
<b>Hart's patent:</b>											
Light strap.....	.....	.....	.....	1.15	.....	1.70	2.30	3.90	.....	.....	.....
Heavy strap.....	.....	1.00	1.25	1.75	.....	2.85	4.25	.....	.....	.....	.....
Ex. Heavy T.....	.....	.....	1.70	2.10	.....	3.35	4.85	.....	.....	.....	.....

## Standard Wrought-Iron Pipe.

Inch.....	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Black.....	\$0.24	.33	.50	.62	.74	.88	1.06	1.23	1.65
Galvanized ..	.28	.38	.57	.68	.88	1.03	1.31	1.60	2.00
<b>Lap-Welded.</b>									
Black.....	\$0.24	.33	.50	.62	.74	.88	1.06	1.23	1.65
Galvanized ..	.28	.38	.57	.68	.88	1.03	1.31	1.60	2.00
<b>Butt-Welded</b>									
Black.....	\$0.04	.04	.04 1/2	.06	.07 1/2	.10 1/2	.14	.18 1/2	.....
Galvanized ..	.05	.05	.05 1/2	.08	.09 1/2	.13 1/2	.18 1/2	.....	.....

## Hasps and Staples.

Inch.....	4	5	6	7	8	9	10	12
Plain.....	\$0.84	.90	1.00	1.10	1.30	1.70	2.00	2.60
Japanned ..	1.00	1.10	1.20	1.30	1.60	2.00	2.30	3.10
Galvanized ..	1.50	1.60	1.80	2.00	2.50	3.00	3.50	4.50
<b>Extra Heavy.</b>								
Plain.....	.....	1.36	1.50	1.70	2.00	2.30	3.50	.....
Japanned ..	.....	1.60	1.75	2.00	2.35	2.70	4.25	.....
Galvanized ..	.....	2.50	2.75	3.00	3.50	4.00	6.00	.....
<b>Hasps and Staples, With Hook.</b>								
Plain.....	1.20	1.40	1.60	1.80	2.20	2.50	3.84	.....
Japanned ..	1.40	1.65	1.90	2.10	2.60	3.00	4.50	.....
Galvanized ..	2.25	2.50	3.00	3.50	4.00	4.50	7.00	.....
<b>Extra Heavy.</b>								
Plain.....	.....	1.80	2.00	2.30	2.60	2.90	4.50	.....
Japanned ..	.....	2.10	2.35	2.70	3.00	3.40	5.25	.....
Galvanized ..	.....	3.50	4.00	4.50	5.00	5.50	8.00	.....
<b>Bent Hasps and Staples.</b>								
Plain.....	1.10	1.30	1.40	1.60	2.00	2.20	.....	.....
Japanned ..	1.30	1.50	1.60	1.85	2.30	2.50	.....	.....
Galvanized ..	1.75	2.00	2.25	2.50	3.00	4.00	.....	.....

## Steel Squares.

S & Co. Polished.	Per doz.	PS & W Co. S C Co.	ESq Mfg Co.	R & E Mfg Co.	Am Sq Co.
1.....	\$48.00	1	1	1	1
2.....	44.00	2	2	2	2
2 1/2.....	40.00	2 1/2	2 1/2	2 1/2	2 1/2
3.....	35.00	3	3	3	3
4.....	33.50	4	4	4	4
5.....	32.50	5	5	5	5
6.....	31.00	6	6	6	6
7.....	30.00	7	7	7	7
8.....	27.00	8	8	8	8
9.....	25.50	9	9	9	9
10.....	22.50	10	10	10	10
11.....	21.00	11	11	11	11
12.....	30.00	12	12	12	12
13.....	27.00	13	13	13	13
14.....	25.50	14	14	14	14
15*.....	276.00	15	15	15	15
16.....	75.00	..	..	..	16
31.....	12.00	31	..	..	31
32*.....	15.00	32	..	..	32
34.....	22.00	34	..	34	34
40.....	14.50	..	..	..	40
41.....	11.50	..	..	..	41
100.....	66.00	100	100	100	100
<b>Nickeled.</b>					
101.....	56.00	01	1	1	01
102.....	52.00	02	2	2	02
102 1/2.....	48.00	..	2 1/2	2 1/2	02 1/2
103.....	42.00	03	3	3	03
104.....	40.50	04	4	4	04
105.....	39.50	05	5	5	05
106.....	38.00	06	6	6	06
107.....	37.00	..	7	7	07
108.....	33.00	08	8	8	08
109.....	31.50	..	9	9	09
110.....	27.50	010	10	10	010
111.....	26.00	011	11	11	011
112.....	35.00	012	12	12	012
113.....	34.00	..	13	13	013
114.....	32.50	..	14	14	014
115.....	300.00	..	15	..	015
116.....	85.00	..	..	..	016
140.....	17.00	..	..	..	040
141.....	13.50	20	..	..	041
200.....	74.00	0100	100	100	0100

\* Manufacturers' lists on Nos. 15 and 32 do not agree.

## Garden Rakes.

Teeth..	6	8	10	12	14	16
Steel ..	\$7.00	8.00	9.00	10.00	11.00	12.00
Malleable.	4.50	5.00	5.50	6.00	6.50	7.00

## Chisels.

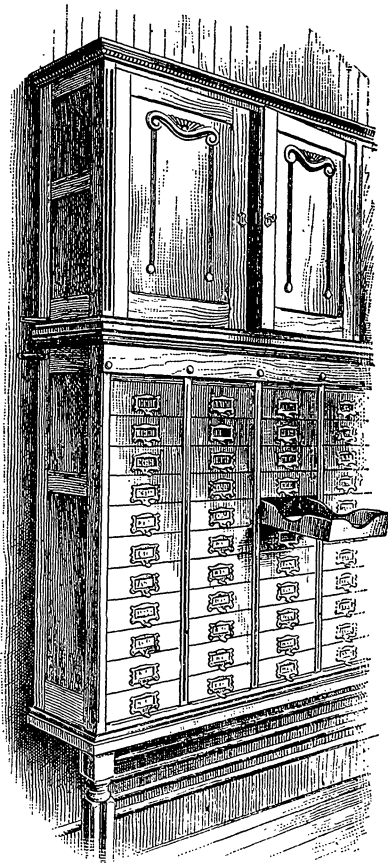
Inches.	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
Socket Firmer..	\$8.00	\$8.00	\$8.00	\$9.00	\$10.00	\$11.00	\$11.00	\$12.00	13.00	\$13.00	\$14.00	\$15.00	\$16.00
Socket Framing ..	.....	12.00	12.00	12.00	13.00	14.00	15.00	16.00	18.00	18.00	20.00	22.00	24.00
Socket Corner..	.....	.....	.....	22.00	24.00	28.00	30.00	32.00	34.00	36.00	.....	.....	.....
Tang Firmer.....	2.00	2.00	2.13	2.25	2.60	2.75	3.00	3.50	4.50	5.00	6.00	7.50	9.00
<b>Unhandled.</b>													

From The Iron Age STANDARD HARDWARE LISTS, for use in Price Books.



## Catalogue File Case.

WE ARE INDEBTED to the W. Bingham Company, Cleveland, Ohio, for photographs of their catalogue file case, reproductions of which are given herewith. The cabinet is located in the buyers' office, and is used for filing pamphlet catalogues, lists, circulars, quotations, &c., of the various goods in the lines they carry. The filing case is 10 feet 10 inches long and 4 feet high and consists of 11 tiers of 11 compartments each. In front of each compartment is a slide, which when raised discloses a neat tray 12 inches long, 10½ inches wide and 3 inches deep, with sides and ends slashed to facilitate getting at its contents. The index used is practically that of *The Iron Age* Multiple Index Price Book E, and indeed it was this index that first suggested the idea of the cabinet, as it occurred to H. S. Blossom, the secretary of the company, upon examining this book, that a file,



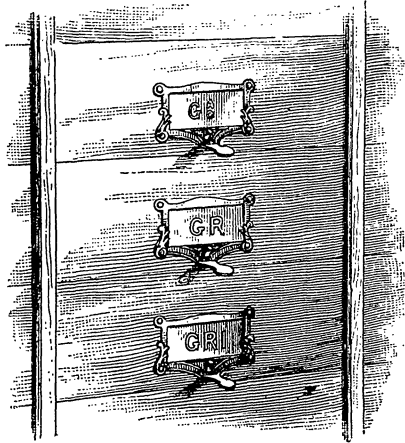
Catalogue File Case of the W. Bingham Company.

with this index would settle the vexed question as to how to conveniently care for the many small lists, &c., that it is necessary to have for reference. The index first put on the case was identically the same as that of Price Book E, but it was later found necessary to modify it, in order to relieve some trays that were too full, which was done by adding "Bells," "Locks," "Machines," "Pumps," "Refrigerators," "Tinware," "Tools," and "Wire Goods."

The whole is locked by simply turning a handle or fixed key at one end, and can only be unlocked by a key in the posses-

sion of Mr. Blossom's assistant, thus securing absolute privacy as to its contents.

As each list is filed under the name of the article listed, it is entered upon an index book under the name of the firm issuing it, the tray into which it is put being noted, so that it is but the work of a mo-



Enlarged View of Index.

ment to find either the lists of any particular firm or all the lists of the makers of any particular article. There could hardly be an arrangement more complete or convenient, and the cabinet referred to is as satisfactory as a file as the Price Book E is as a register of quotations.

On the top of the file is a cupboard 2 feet 9 inches high and 10 feet 10 inches long containing one shelf, and inclosed by six carved oak doors. This is used for large catalogues. The whole is mounted on legs 24 inches high, making the entire height 8 feet 9 inches, the depth of the case being a trifle over 14 inches.

## Protection to Merchants.

A RETAIL HARDWARE MERCHANT of Iowa referring to this subject expresses his views as follows:

While I may be, and am, among the little fish as a merchant, yet I am able to think, and my thoughts on this subject are summed up in a few words. If the manufacturers wish to be fairly dealt with and wish the patronage of jobbers, and through the jobbers the retail trade, the manufacturers should see to it that their goods are placed in the hands of the regular jobbers and not in the hands of retail jobbers. For instance, I will mention one line of goods especially which are being sent out to our should-be customers at prices about as low as I can buy the same goods from my jobber. The goods I refer to are a line of Firearms, manufactured by one of the largest concerns in the country. A customer comes into my store, asks the price of one of their Rifles or Repeating Shot Guns. I name him a close price for cash. Well, he answers, I can get those goods of Messrs. \_\_\_\_\_ for much less money, &c. My advice would be that manufacturers protect the jobbers, and that jobbers protect the retailers.

He remarks in closing that Firearms were selected as an example, as a case of this kind had come up during the day, but that the entire Hardware business is becoming demoralized on account of jobbers quoting low prices to consumers.

## A New Zealand Hardware Merchant's Advertisement.

THE METHOD which is frequently adopted by merchants in the colonies in calling attention to goods which have just been received from this country or other markets is illustrated below, where we give the substance of an announcement recently made by a Hardware merchant in New Zealand. In connection with the merchant's name and address the following announcement is made, which, besides illustrating the methods adopted in these markets, is of interest as showing in some detail the lines of goods imported:

*Just Landed from New York.*

- 68 Cases Mann's Axes.
- 61 Hickory and Ash Planks.
- 40 Boxes Clothes Pegs.
- 10 Kegs Cut Nails.
- 180 Boxes Putnam's Horse Nails.
- 7 Cases Store Trucks.
- 86 Cylinder Churns.
- 8 Cases Bidwell & Frazer's Axle Grease.
- 11 Cases Wringing Machines.
- 3 Cases Scythe Snaths.
- 4 Cases Hay Forks, 2 and 3 Prong.
- 1 Case Carpenters' Pencils.
- 1 Case Spare Rollers for Wringers.
- 2 Bales Broom Handles.
- 1 Case Lemon Squeezers.
- 1 Case Hendry's Sheep Toe Pruners.
- 2 Cases Buggy Tops.
- 1 Case Pig Rings and Ringers.
- 1 Case Sarl's Whip Sockets.
- 1 Case Coleman's Axle Clips.
- 2 Cases Chair Seats, 14, 16 and 18 inch.
- 1 Bale Cotton Sash Line.
- 2 Cases Screw Wrenches.
- 6 Nests Flour Pails.
- 6 Howe Platform Machines, 400, 600, 800 and 900 pounds.
- 4 Cases Drilling Machines.
- 1 Case Morse Twist Drills.
- 3 Cases Tinned Rivets.
- 2 Cases Buggy and Team Collars.
- 2 Cases Cheney's Hammers, each Nos. 5, 7, 35.
- 1 Case Cherry Welding Compound.
- 2 Bales Rubber Wagon Buffers.
- 40 cases Valvoline C Machinery Oil.
- 70 Kegs Anchor Axle Grease.
- 25 Cases Turpentine.
- 10 Cases Lard Oil.
- 14 Cases Carriage Woodware.
- 11 Packages Rims, Poles, Shafts, &c.
- 27 Packages Sundries.
- 3 Cases Ames' No. 3 Shovels.

*To Arrive.*

- 6 Cases Sledge Hammer Handles.
- 1 Case Horse Hoes.
- 3 Cases Rochester Lamp Glasses.
- 20 Kegs Cut Nails.
- 1 Case Turkey Feather Dusters.
- 2 Cases American Team Collars.
- 49 Hides Morocco Trimming Leather.
- 6 Barrels Valvoline C Machine and Railway Cylinder Oil.
- 2 Cases Ames' L. H. Shovels, No. 3.
- 4 Cases American Rim Locks.
- 1 Case Cow Bells.
- 1 Case Drawing Knives.
- 2 Cases K. H. Bright Wrenches.
- 1 Case Sewing Machine Oil.
- 1 Case Hay Forks.
- 6 Cases Grindstone Fixtures.
- 30 Barrels Plaster of Paris.
- 70 Cases Mann's Eureka Axes, 3½ to 5 pounds.
- 17 Cases Putnam's Horseshoe Nails.
- 1 Case Buggy Tops.
- 1 Case Miter Boxes.
- 2 Cases Wrought-Iron Carriage Fittings.
- 9 Cases Eureka Wringers.
- 1 Case Galvanized Rowlocks.
- 1 Case Dixon's Carpenters' Pencils.
- 2 Cases Shovel and Spade Handles.
- 1 Case Le Page's Glue.
- 13 Crates Cylinder Churns.
- 1 Case Cart Springs.
- 25 Barrels Valvoline Axle Oil.
- 14 Packages Fairbanks Scales.
- 12 Packages Dover & Glen Stoves.
- 4 Cases Iron Carriage Fittings.
- 1 Case Coach Door Locks.
- 2 Cases Hay Rakes.
- 20 Kegs Cut Nails.
- 3 Cases Douglas' Pumps.
- 28 Packages Carriage Woodware.
- 103 Cases containing Axe, Adze, Pick, Sledge and Hand Hammer Handles.
- 50 Cases Valvoline C Machinery Oil.
- 20 Cases Valvoline Railway Cylinder.
- 2 Barrels Valvoline Dark Axle Oil.
- 11 Cases Cartridges and Cases.

## Keeping Dates of Invoices.

THE INQUIRY which appeared in a recent issue of *The Iron Age* for a successful method, entailing a small amount of labor, of keeping in sight the dates on which invoices become due, so as to avoid being drawn on, or the loss of discounts, has elicited a number of replies.

The accompanying cuts are reproductions of plans in successful operation, and are of particular interest because of their variety.

Case & Uehren, Aurora, Ill., have for some years used a block calendar, as shown in Fig. 751, and find it very convenient for making memoranda of bills payable,

October 31 Days.

**24**

**MONDAY**

297-68 1892

Pay Hibbard Spear & Co.  
Sawmill Hillside  
Bathhouse Saddle  
Russell & Erwin Mfg. Co.

Call at Brown's  
See Smith about Furnace  
Pay Insurance  
Put in roof on King's house

Fig. 751.—Case & Uehren's Use of the Calendar.

and of matters requiring attention on particular dates.

The plan of G. L. Phillips, Bethany, Mo., as shown in Fig. 752, gives a page to each month, and is ruled by himself. It gives the page on which the bill is entered, name of the firm, the date when each bill was paid, amount of the invoice, its date, time to run, date due, cash discount, and the amount of discount. In addition to this it is a record of the amount of goods purchased each month, and the total amount of discount for the month. By adding these monthly amounts together the total for the year is soon arrived at.

Day & Holt, Catskill, N. Y., use a well-bound four-quire record book, and rule it as shown in Fig. 753. When an invoice has been checked and footings and prices found correct, it is entered under the proper month, the date on which it becomes due. The dates near the left-hand corner of the page are in red ink and represent the Sundays in the month. Having these dates in sight, if an invoice should be dated September 1, based on ten days' payment, it is seen that it is due on the 11th, which is Sunday, and, therefore, it would be entered as payable on the 10th. It is the custom of the firm to pay

on Monday such bills as become due during the current week, and stamp "Paid" in the column provided for that purpose. They find this plan answers the purpose, and is convenient, as at a glance they can tell how much they are owing. This they suggest tends to prevent careless buying at such times as a merchant might think he had small liabilities coming due, had he not some guide of this kind to show just where he stands.

When paying bills Day & Holt use the remittance blank with voucher, or blank

about 3000 bills. The publisher explains the system as follows:

The bill-registering book shows the date of bill, amount of bill, the different rates of discount to which the bill is subject when it is due, the rate and amount of discount taken, the amount of cash paid and the date of payment, making a complete record of the bill from the time it is received until it is disposed of. It also makes a complete merchandise, discount and cash account, dispensing with the use of ledger accounts for bills payable. So far as the merchandise is concerned it enables the mer-

*Bills Payable Sept 1892*

Page	Name	Paid	amt	Date	Time	Due	per cent	amt. of disc.	amt. of bill
56	Simmons Adams Co.	9/17	80.00	9/10	60d	11/10	2-10d	1.60	
56	do	9/17	98.00	9/10	30"	10/10	1-10"	98	
83	Excelsior Mfg. Co.	9/20	150.00	9/13	47mo	1/13	5-30d	7.50	

Fig. 752.—G. L. Phillips' Plan.

receipt attached as shown in Fig. 754. This secures uniformity in size of receipts for filing, while the voucher number corresponds to the number of the invoice, for ready reference.

Sommer Bros., Portsmouth, Ohio, use a form much the same as shown in Fig. 752. They utilize pages in their ledger, the headings extending across both pages as follows: Date of invoice, month, received, name of firm, location, amount of invoice, freight, overcharges, freight rebate, rate of discount, amount of discount, amount of check, number of check, date

chant to see at a glance which bills are paid and what are unpaid, and at what time he can pay them to save the greatest amount of discount. It also enables him at any time to see just the amount of merchandise bought, the amount returned, what shortages, claims or rebates stand charged against the bill, the amount of discount saved, and the amount of the actual net cash the merchandise has cost him. Each bill being numbered to correspond with number on register and filed consecutively, the bill file becomes paged like a book, and any invoice can then be very quickly and easily found.

Griffith Hardware Company, Rushville, Ill., who have used the Robb system for

*Sept. 1892*

Day of month	Remarks	
Paid. 3	Phelps Dodge & Co.	77.00
Paid. 8	Sickels S & L	93.44
Paid. 15	Russell & E. Mfg. Co.	64.82
Paid. 17	Phelps Dodge & Co.	36.00
Paid. 27	Pottstown Iron Co.	86.22
	Less Freight	

Fig. 753.—Day & Holt's Plan.

paid, time and when due. They refer to this memorandum, being kept in their ledger, as avoiding the necessity of devoting a separate ledger page to each firm from whom they buy goods.

In answer to an inquiry, T. M. Clark, Bloomington, Ill., sends a sample sheet of Robb's Bill Register, published by him, of which Fig. 755 is a reproduction, reduced in size. The 150 pages in this book are each 8½ x 14 inches in size, properly indexed and paged, and will accommodate

several years, advise us that they find it the most perfect system they have ever used, and as soon as one book is filled they order another. Referring to their manner of using the book, they remark:

We keep no other account of our purchases than in this book; the whole of each transaction is complete, and we are able to refer to it in a moment at any time, and it need not go on the journal at all.

In connection with this register a remittance blank is published, together form

ing, it is stated, as nearly as possible, a barrier against mistakes; as a cashier receiving such remittance has an exact transcript of the register, and if incorrect, errors can be immediately detected.

### Discount for Cash.

**T**HE ENGLISH retail merchant as a rule extends longer credit to customers than is usual in this country. From the accompanying card, taken from a London paper devoted to the interests of the Hardware trade, it will be seen that there is a tendency to encourage a cash

in the habit of asking for credit. The suggestion this offers may be of service to merchants who are doing a part credit and part cash business, and who are desirous of educating their customers to pay cash for their goods. Whether the credit part of a business yields any considerable profit, is a question deserving consideration.

**Cash or Credit.**

**T**HE MATTER of cash or credit business is thus touched upon by a Hardwareman in Ohio:

It goes without saying that every retail merchant believes that a store run on cash

[illegible]

*Fig. 754.—Convenient Remittance Blank (Reduced Size).*

business. The card, which is about 3 x 4½ inches in size, reads as follows:

1<sup>D.</sup> in the 1<sup>S.</sup>  
From All Goods paid for  
at the time of purchase  
at  
**TOLLIT'S**  
IRONMONGERY  
ESTABLISHMENT,  
**46, High Street,**  
*ST. JOHN'S WOOD.*

The cash discount which is offered, of one penny on every shilling's worth of goods, is equivalent to about 8 per cent. The card was extensively distributed by Mr. Tollit throughout the district tributary to his store. He has found the plan successful, as it has brought new customers, as well as pleased some of those who were

principles is the ideal of business. Yet it is considered difficult in some lines to place one's sales on a strictly cash basis. Take for instance a Hardware store, where the sales are half cash and half credit, with the book accounts gradually getting the upper hand, it would seem that something ought to be done to turn the balance of sales on the cash side. There is no matter so disastrous to retail merchants as that of extending credit without proper discretion. The cost of keeping the books, collecting bills and loss of bad debts oftentimes equals the profit on credit sales. The man who wishes to pay cash and get full value for his money prefers to trade where his money goes furthest.

The dealer can afford to sell cheaper, since he has his goods or their equivalent always on hand, and is in a position to make money for his customers by discounting his own bills, thereby reducing the cost to his customer. We believe the time has come when the careful public will give preference to the cash store, and have therefore decided that on and after January 1 we will sell strictly for cash or its equivalent. Our prices at all times will be as low as is consistent with good goods and a fair margin of profit. We shall not try to make you believe we sell below cost, because the man who does is usually deceiving you, but we will aim at all times to please and give you full value for your money.

[illegible]

*Fig. 755.—Robb's Rill Register.*

## Manufacturing.

**DILLE & ANDERSON** of Richmond, Ind., report the increase in the demand for their Lawn Mowers to have been so rapid as to warrant the enlargement of their present plant, which will be done at once.

The Indiana Bicycle Company, Indianapolis, Ind., state that the sales for their product thus far has been exceedingly satisfactory and the prospects for a continued good demand are excellent.

**Higganum Hardware Company**, Higganum, Conn., since the recent fire, which destroyed their entire works, machinery and stock, have leased room and power from the Cutaway Harrow Company, and refitted their shop with entirely new machinery and improved appliances for the manufacture of their special goods—the Acme Cutting Nippers and Wire Pliers, also the Samson Jacks and other Hardware specialties. The company are now in a position to fill all orders for Nippers and Pliers promptly.

Under an arrangement just effected the Cash Register business of the Lamson Consolidated Store Service Company, Boston, and Kruse Cash Register Company, New York, has been transferred to the National Cash Register Company of Dayton, Ohio, the Store Service Apparatus business of the latter concern being transferred to the Lamson Consolidated Store Service Company. It is expected that this consolidation of conflicting interests and the termination of the expensive competition between them will enable the National Cash Register Company to conduct the business more economically, and supply the increasing demand for low-priced Cash Registers.

The firm of **Hammond & Cooley**, which, a few weeks ago, commenced the manufacture of Bicycle Pedals at Batavia, N. Y., is about to be succeeded by an organized stock company, with a capital stock of \$40,000. The incorporators are: Charles H. Caldwell, James A. Le Seur, Thomas H. Cooley, Leon W. Hammond and Dr. J. W. Le Seur.

The plant of the **Globe Tack Works** at Norristown, Pa., will in the future be operated by a new concern recently chartered, known as the Penn Tack Company, of which W. N. Easton is secretary and treasurer. Mr. Easton was with Chess Brothers, formerly Chess, Cook & Co., Nail and Tack manufacturers of Pittsburgh, for about 12 years, and Mr. H. J. Weimar, who is also identified with the concern, has been in the Hardware business at 1921 Carson street, S. S., Pittsburgh, for a number of years. The officers of the Penn Tack Company are Jos. Rambo, president; W. N. Easton, secretary and treasurer, and W. J. Clark, manager. The new concern will manufacture tacks only and expect to secure their share of the trade.

The **Richardson Tack Hammer**, an illustrated description of which appeared in *The Iron Age*, February 23, 1893, is now made without the slot in the head for holding the Tack while driving. The slot is considered unnecessary, as the head of the Hammer is magnetized, and will hold a Tack firmly without the aid of a slot.

The **Novelty Stamping Company** of Bellaire, Ohio, have recently fitted up their building with new machinery and expect to commence operations about the 15th inst.

**A. C. Barler**, secretary and treasurer of the **Huette-Barler Mfg. Company**, Chicago, was granted letters patent on February 21 last for a most complete shoe-blackening outfit. It is a small metal cabinet, arranged for fastening to a wall, the door forming a foot rest when opened. It is so ingeniously constructed that every part of the interior is utilized in the stowage of blacking apparatus, and is therefore unusually compact and takes

but little room in shipping. It has been very favorably received wherever introduced, and the manufacturers are encouraged to believe that it will become a staple article with the Hardware, house-furnishing goods, furniture and boot and shoe trades.

**Arnold & Co.**, Norwalk, Conn., general iron founders and manufacturers of Hardware Specialties, are directing their particular attention to the general iron foundry work, making steam heating or cored work a specialty. In Hardware Specialties they illustrate in their catalogue, Casters, Boss Anti-Friction Hanger and Roller, Duplex Wood Track Hanger, Union Barn Door Roller, Stable Fixtures, &c.

## Price-Lists, Circulars, &c.

**BETTENDORF HOLLOWSTEEL AXLE WORKS**, W. P. Bettendorf, proprietor, Davenport, Iowa: Catalogue and price-list of the Bettendorf Steel Wagon Bolster and Combined Steel Bolster and Self-Oiling Hollowsteel Wagon Axle. Full particulars are given regarding this new article of manufacture, which is designed to take the place of the ordinary wooden axle, sandboard, bolster and stakes, with their multiplicity of parts. The method of manufacture is described, so that the advantages of the Bettendorf Axles may be easily grasped. They are expected to be handled by the jobbers in heavy Hardware, who now carry wooden wagon parts in stock. The catalogue is handsomely printed, comprises 12 pages, and is neatly bound in stiff paper covers.

**THE PRINDLE MFG. COMPANY**, Aurora, Ill.: The **Prindle Sliding Door Hanger**. A small pamphlet, entitled "Three of a Kind," is devoted to three sizes of these Hangers, suitable for doors from 4 feet to 7½ feet in width. The hangers are made of soft gray Iron and polished Steel, each set being provided with the Chase overhead adjustable stop.

**HAMBLIN & RUSSELL MFG. COMPANY**, Worcester, Mass.: Hardware Specialties and Standard Wire Goods. Illustrations are given of Broilers, Strainers, Pot Cleaners, Steel Forks, Vegetable Skimmers, Egg Beaters and Whips, Toy Pistols, Nutmeg Graters, Traps, Sink Cleaners, Lamp Shades, Wire Coat and Hat Hooks, &c.

**ROBERT C. REEVES COMPANY**, 185 and 187 Water street, New York: Agricultural and Horticultural Implements, Machinery, Garden, Field and Flower Seeds, Fertilizers, &c. An illustrated catalogue just issued shows an interesting variety of Implements, Machinery, &c., giving prices of these goods and also of Seeds, Fertilizers, &c. Descriptions and directions concerning each variety of Seeds and their culture are given, which adds much to the interest and value of this department of the work.

**WALBRIDGE & Co.**, Buffalo, N. Y.: Iron Reservoir Vases. A large-sized catalogue of 58 pages is largely devoted to illustrations and prices of these goods, showing a large variety of sizes and styles. The arrangement of the Vase is such that the moisture is drawn up to the plants by capillary attraction, thus avoiding constant watering. A small line of Rustic Settees and Folding Chairs is also shown.

**BELLAIRE STAMPING COMPANY**, Harvey, Ill.: Plain and Retinned Stamped Ware, Enameled Steel Ware, Seamless Flanged Drip Pans, Tubular and Buckeye Lanterns and Sheet Metal Specialties. A circular calls particular attention to Columbia Enameled Steel Ware, Seamless Drip

Pans, Frostberg Miners' Lamp, Tin Jacket Oil Can, Chase Pattern Oiler and Improved Crank Lantern.

**AMES PLOW CO.**, Boston and New York Farming Implements and Machinery, Contractors' Supplies, Ice Tools, Harness, Carts, Trucks, Wheelbarrows, &c. An 1893 catalogue illustrates these goods, with prices and descriptions.

**CAPITAL CITY FENCE COMPANY**, Indianapolis, Ind.: Fences. Their catalogue illustrates Lawn, Park, Farm, Cemetery and Railroad Fences. An Iron Screw Fence Post has lately been put upon the market by them, which obviates the necessity of digging a hole for setting it. The above company are also successors to the Poindexter Mfg. Co., which will, however, continue its plant, giving entire attention to the manufacture of its Corn Splitting Machine. The catalogue includes illustrations and descriptions of Fences and Fence Goods formerly made by this company.

**PECK, STOW & WILCOX COMPANY**, New York, and Southington, Conn.: Tinsmiths' Tools and Machines. This catalogue is known as the Columbian edition, and illustrates, among other goods, Stow's new Columbian Machines. These are made with interchangeable parts and with solid frames, and are recommended by the makers as serviceable machines, being strong and durable.

**KANKAKEE MFG. COMPANY**, Kankakee, Ill.: Illustrated catalogue of Kankakee Hardwood Refrigerators. This is a 24-page pamphlet describing a large variety of upright Refrigerators, Ice Chests, Sideboards, &c. The upright Refrigerators are made in numerous styles—single and double doors, open and closed ice fronts, with and without porcelain lined water coolers, and either plain finish or handsomely carved wood work. Trimings are of solid bronze, ice racks are of metal, doors overlap snugly, baseboard is hinged, and in every particular great care is taken to secure the best results possible, both as to attractiveness in appearance and efficiency in refrigeration. The sideboards made by this company are of solid oak, richly molded and well calculated to grace handsomely appointed apartments. A sectional view is given of the system of air circulation adopted in these Refrigerators, together with a very interesting description of the method of their manufacture.

**THE NATIONAL MFG. COMPANY**, Boston and Worcester, Mass.: A new edition of their Standard Wire Goods just issued containing the well known patterns of Kitchen and House Furnishing Goods, Window Guards and Door Grilles, Bank, Counter and Fancy Brass Desk Railings, Stall Partitions, Flower Stands, Hanging Baskets, Traps, Sifters, &c.

**EDWARD S. HOTCHKISS**, Bridgeport, Conn.: Toilet and Horse Clippers, Baxter Wrenches, Straight Flush Lemon Squeezer, Steel Rat Killer, Metallic Mouse Trap, Curry Combs, Steel Rat Traps, &c. These goods are illustrated in a circular which calls attention to the desirability of the line.

**T. G. ELLSWORTH**, 85 Chambers and 67 Reade streets, New York, agent for the Planet, Jr., Farm and Garden Implements carries samples and stock of these goods and is prepared to furnish them at factory prices. The line includes Seed Drills, Wheel Hoes, Horse Hoes, Cultivators, &c.

**THE WISCONSIN REFRIGERATOR COMPANY**, Eau Claire, Wis., Ross & Fuller Association, 33 Chambers street, New York, representatives: Refrigerators. Illustrations are shown of the Wisconsin Peerless

Hardwood, Dry Air Household Refrigerators, Ice Chests, Grocers', Hotel and Butchers' Sectional Refrigerators, Sideboard Refrigerators, &c., with mineral fiber filling and cleansable flues. A smaller catalogue, envelope size, is issued for the convenience of the trade, containing the same matter as the larger one.

THE ILLINOIS PURE ALUMINUM COMPANY, Lemont, Ill.: Aluminum Cooking Utensils. In a circular explaining the advantages of these goods, the fact is stated that these Utensils do not scorch milk or farinaceous foods. It is explained that this is partly owing to the high heat conductivity of the metal, which effectively boils food without placing the Utensil on the hottest part of the stove, and partly to the absence of any propensity in aluminum causing food to stick to it. It is also pointed out that Aluminum Utensils are longer lived than vessels in which mineral and metal are combined and that while the heat conductivity is greater, the expansion is equal.

COLUMBIA SPRING COMPANY, Cleveland, Ohio: Vehicle Springs. Their catalogue gives tabulated information of weights and capacities of Springs, together with illustrations and explanation of grades of Springs. The company state that they are enabled to execute orders with dispatch, as they have factories at Bridgeport, Conn.; Pittsburgh, Pa.; Cleveland, Canton and Cincinnati, Ohio; St. Louis, Mo.; Hammond, Ind., and Fort Plain, N. Y.

WILLIAMS & DAVISSON, Weston, W. Va.: Universal Glass Case. The Glass Case occupies a floor space 2 x 6 feet and is 7 feet high, made of yellow poplar finished in walnut and cherry stain. It is arranged to accommodate 35 sizes of Glass in sizes from 8 x 10 to 24 x 48 inches, and is referred to as enabling the dealer to carry a complete stock of salable sizes of Glass for the general retail trade in a small space.

E. C. MEACHAM ARMS COMPANY, St. Louis, Mo.: Catalogue No. 531, March 3, 1893. Tennis Goods, Lawn Mowers, Baseball Goods, Bicycles, Bicycle Sundries, Tents, Refrigerators, Children's Carriages, Pocket Cutlery, Razors, Roller Skates, Fishing Tackle, &c.

PEERLESS RUBBER MFG. COMPANY, New York, with agencies at San Francisco, Pittsburgh, Cleveland, Detroit, Milwaukee, Cincinnati and Chicago: Rainbow Packing, Eclipse Sectional Rainbow Gasket, &c. A descriptive catalogue contains information of Peerless Fire Hose, Rainbow Sheet Packing, Eclipse Sectional Rainbow Gasket, Peerless Piston and Valve Rod Packing, Hot-Water Tank and Washout Hose, Steam Hose, Gas Hose, Rainbow Gauge Glass Rings, Brewers' Hydraulic Oil and Tanners' Hose, Steel-Clad Suction Hose, Valve Disks, Peerless Diamond Mats, Metal Inserted Step Mat, &c. A separate catalogue deals with Rubber and how it is manufactured, giving inside views of different departments of their factory, and explaining the various processes through which the Rubber passes in course of preparation.

THE CLEVELAND FOUNDRY COMPANY, Cleveland, Ohio: Oil and Gas Stoves, Registers and Hardware Specialties. Illustrations are shown of Oil and Gas, Heating and Cooking Stoves, Registers, Stove Extension Tops, Ovens, Broilers, Sad-Iron Heaters, Pott's Sad Irons, Hose Menders, &c.

THE CREAMER & SCOTT COMPANY, Milton, Ind.: High Grade Pleasure Vehicles. Illustrations of Steel Dandy Cart, Steel Dandy Phaeton Cart, Short Turn Wagon, English Carryall, Buggies, Whitechaps, Phaetons, Surreys, &c.

## It Is Reported—

That a new Tinware store has been opened at Amesbury, Mass., by a Mr. Beliveau.

That C. A. Tanner & Co., Hardware merchants, Oswego, N. Y., are making a considerable addition to the capacity and facilities of their establishment.

That J. W. Clark has recently opened a Hardware store at Ashley, Ind.

That J. W. Morse of Elgin, Ill., has bought B. E. Barrows' Hardware store at West Dundee for \$5500.

That the Hardware store of Henry Roos at Pekin, Ill., was burglarized recently and \$200 worth of goods taken.

That Novok & Svitak, Hardware and Implement dealers at Howells, Neb., have been succeeded by Novak & Popelar.

That Howley Brothers, Hardware dealers at Scranton, Pa., have purchased the double brick building at Penn avenue and Mulberry street, and will take possession of it on April 1 next.

That the Omahundo Hardware Company's store at Sherman, Texas, was robbed on the 1st inst.; \$300 worth of Knives, Razors, Pistols, &c., were stolen.

That J. M. Armstrong, formerly secretary of the Delaware Gas Company, Delaware, Ohio, has purchased a half interest in the Hardware store of R. J. Pumphrey, and the firm will hereafter be known under the style of Pumphrey & Armstrong.

That Ferguson & Sanford have purchased the stock of Hardware formerly owned by J. W. Stout, Topeka, Kan., and will continue the business at the old stand.

That Inhelder & Son, Hardware, Pierce, Neb., have been succeeded by Inhelder & Schriever.

That G. H. Willis, Hardware dealer at Chadron, Neb., has disposed of his business.

That J. E. Weber, dealer in Hardware and harness, Howe, Neb., has sold out.

That S. S. Brooks & Co., Augusta, Maine, are making improvements in the interior of their Hardware store. A handsome plate glass front will be put in and the office will be partitioned off with natural wood and plate glass.

That the Hardware store of Francis A. White, Cambridgeport, Mass., was destroyed by fire on the 5th inst.

That John E. Walsh, who has conducted a Hardware, Stove and Tin store at West Warren, Mass., for several years, has completed arrangements to open a branch store at Warren, with Henry A. Tannebrink as partner.

That Way & Co., Hardware merchants, Hartford, Conn., who recently bought out the old-established store of A. T. Fowler & Son, Willimantic, Conn., have made alterations and improvements in it, including new plate-glass windows, counters, shelving, &c.

That fire destroyed the Hardware store of W. C. Urbach, Goldthwaite, Texas, on the 27th ult. Loss, \$2500; no insurance.

That Dewey & Adsit have purchased the Hardware stock of Theodore Simons, Manlius, N. Y., and will continue the business.

That Bullock & Bryant, Implement dealers, Blanchard, Iowa, have been succeeded by Bryant & Thompson.

That Adams Bros. of Mexia, Texas, successors to M. Adams & Sons, are doing business as the Utility Mfg. & Repair Company, and will add a full line of Hardware, Stoves, &c.

That the Haynes & Chalmers Company have been organized at Bangor, Maine, for the purpose of engaging in the wholesale and retail Hardware business, with \$50,000 capital stock. The officers are:

Joseph H. Haynes, president, and James J. Haynes, treasurer. The certificate of incorporation was approved March 7, 1893.

That Taylor & Crow's Hardware store at Welland, Ontario, was slightly damaged by fire on the 6th inst. The loss was \$1000, covered by insurance.

That Seaton & Wood, dealers in Implements, Wallace, Neb., have been succeeded by Clary & Wood.

## Paints and Colors.

*It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.*

The past week has witnessed a decided improvement in the transfer of many lines of Paints and Colors from first hands into the channels of distribution and consumption. Surface appearances are that this is due in a good measure to purchases by retailers and contractors who held aloof as long as possible in consequence of the backwardness of the spring season for outdoor work, but evidence is not wanting that encouraging prospects for the near future are beginning to stimulate action, not only in this city and immediate vicinity, but in more remote points where weather conditions have acted as a very serious drawback to business during the past month or six weeks. In some branches of the market prices still show more or less unevenness, the natural outcome of disappointing distribution, but weak spots are healing and the appearances are that lowest prices for the season will rule at the start unless some very radical change takes place in the market for base materials or the demand turns out extremely disappointing from this time forward.

*White Lead.*—There have been no new developments in the market for anything in this line. Competition during the early part of the month would appear to have forced prices to the lowest point at which corrodors or manufacturers of Mixed Leads are inclined to go, and, instead of making special inducements on price, producers seem to be more interested in increasing the volume of sales. In this they are encouraged by a more liberal run of orders from both local and out-of-town custom, to say nothing of a favorable outlook for a good although slightly backward spring season consumption. Regarding prices there is nothing radically new to note for the period under review, except, perhaps, rather more steadiness, due, in part, to correction of erroneous impressions caused by late misleading statements emanating from speculative circles regarding the general situation, in which quarters actual facts have been greatly distorted.

*Red Lead and Litharge.*—Demand improves rather slowly, but general report goes to show that orders have increased sufficiently to encourage the hope that, although it may be tardy in materializing, the spring season movement will finally reach full average proportions. Prices have varied to a moderate degree only, and, generally speaking, the market shows quite steady tone at this writing.

*Zincs.*—If anything, the market shows rather better tone. Whatever uncertainty or indecision may have been brought about by the unsettled condition of the market for base material early in the year is offset by a sharp reaction in the cost of Ores, and along with that fact is improvement in orders for the Oxide, bringing business in the latter fully up to the average for the season. Prices are quoted as heretofore, and appear to be fairly firm. Foreign brands are moving at old prices, but in moderate quantities only.

*Colors, &c.*—No further changes are announced in prices of any of the leading lines of Dry Colors, and present appearances are that hard pan has been reached pretty much all along the line. In prices



of Oil Colors and Ready Mixed Paints the changes have been few and unimportant. Business has been on a somewhat larger scale, and the market is at present fairly active.

**Miscellaneous.**—The movement in Chalk, Whiting, Putty and Clays generally has been chiefly of routine character, and prices all along the line stand practically the same as they were a week ago.

### Oils and Turpentine.

There have been comparatively few and no really important changes in prices of Animal or Vegetable Oils the past week. Linseed product is stiffer under the influence of the withdrawal of previous low prices by one or two outside Western crushers. On the other hand, tamer speculative interest along with rather lower average prices for Lard and inferior Greases has operated to soften the market for Cotton Seed products and soap-making Oils generally. Fish Oils of all varieties command full former rates, on the strength of the statistical position, but distribution in that line, as in some others, is checked more or less by the comparatively high level of prices. Generally speaking, business has been rather slow the past week.

**Linseed.**—Having considerable stock due this month and next on old contracts, large consumers have manifested very indifferent interest, but from other sources the demand has shown improvement, and this, along with practical withdrawal of some late aggressive Western competition, gives the general market a decidedly firmer tone. The effect of this move is not visible in the operations of buyers thus far, but that a weeding out of soft spots will tend to stimulate spring season trade purchases is considered as being very probable. Crushers' prices are now 50¢ for Raw Oil made from domestic seed, 53¢ for Boiled ditto, and 62¢ for Raw Oil made from Calcutta seed.

**Cotton Seed Oils.**—The surface appearances are that the speculative interest, while free to circulate information and pointers calculated to create the impression that Cotton Oils are worth all the money asked for them, make the most of every opportunity to realize upon their holdings. Large consumers meanwhile pursue a very conservative course, and the smaller ones buy only as imperative wants dictate. No large quantities of oil come upon the market, but present supplies seem to be in excess of the outlet, and prices are therefore somewhat irregular. On prime quality the top figures at present are 48¢ @ 50¢ for crude and 58¢ @ 60¢ for Summer Yellow, and 62¢ @ 63¢ for Summer White on the spot.

**Lard Oil.**—Business in this line has been very moderate, owing chiefly to high cost of the product and feverish condition of the market for raw material. Apart from this there is no feature of interest to note except that indications point to an irregular market until prices for Lard become more settled. Pending developments, consumers are extremely economical, and substitutes and adulterants are brought into play where circumstances will permit. Prices have declined about 2¢ @ 3¢ during the week.

**Fish Oils.**—Supplies of crude Sperm, Whale and Menhaden Oils remain in very strong statistical position. The manufactured products are held very firmly at stiff prices, as a matter of course, but outside of ordinary distribution there is little movement at present. Cod Oils are unchanged in price, but very firm.

**Miscellaneous.**—Cocoanut Oils are a shade easier in price and selling rather slowly. There is some reaction also in Palm Oils and Red Saponified, but Tallow, Olive, Neat's Foot and Rapeseed Oils remain quite firm, although moving in moderate quantities only.

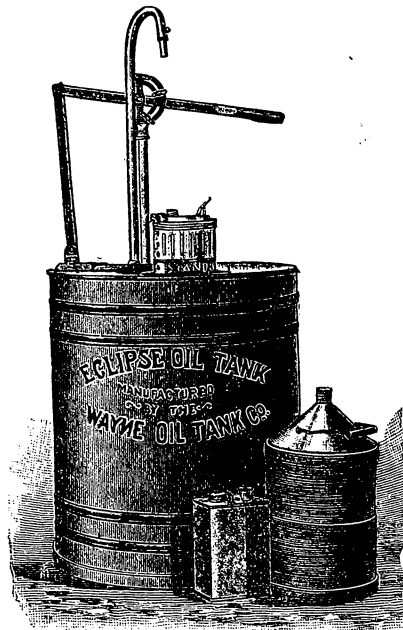
**Spirits Turpentine.**—Between very fair demand here and somewhat better advices from the South, the market has ruled quite firm, with the level of prices somewhat higher, regular barrels selling at 36¢ and machine barrels ½¢ higher.

### CONTENTS.

	PAGE.
The Warren Universal Radial Drill. Illus...	603
The Portland Electric Water-Power Plant...	603
The Strength of Small Chains. Illustrated...	604
The Charcoal Pig-Iron Industry in the United States.....	604
Proportioning a Compound Air Compressor	606
Hydraulic Machinery and Heavy Guns.....	606
Screw Propeller. Illustrated.....	607
World's Fair Notes.....	608
Ingot Molds.....	609
The Schneider Gun Mount. Illustrated.....	610
A Chilean Iron Enterprise.....	611
The Cunard Steamship "Campania".....	612
Thermal Storage for Central Stations.....	613
The Lalance & Grosjean Mfg. Company's Rolling Mill.....	614
The Gillespie Smokeless Furnace. Illus...	615
Treasury Decisions.....	616
The Week.....	617
<b>Editorials:</b>	
Lake Superior Charcoal Iron.....	618
Bumping on the Rocks.....	618
Machinists in the Navy.....	619
Rural Electric Roads.....	619
Enlarging the Locks on the Erie Canal.....	620
Correspondence.....	620
Obituary.....	620
The Tennessee Coal & Iron Management...	621
Washington News.....	621
Mesaba News.....	622
<b>Manufacturing:</b>	
Iron and Steel.....	622
Machinery.....	623
Miscellaneous.....	623
<b>Trade Report:</b>	
Chicago.....	624
Philadelphia.....	625
Louisville.....	625
Cincinnati.....	626
Baltimore.....	626
St. Louis.....	626
Cleveland.....	626
New York.....	627
Metal Market.....	627
Coal Market.....	628
Financial.....	628
Detroit.....	628
Boston.....	628
Pittsburgh.....	629
British Iron and Metal Markets.....	630
The German Iron Trade.....	631
The Copper Production.....	631
<b>Hardware:</b>	
Condition of Trade.....	632
Notes on Prices.....	634
Trade Items.....	636
The Hardware Club of New York.....	636
Letters from the Trade in Regard to the New Cut-Nail Card.....	637
After Mexican Trade.....	639
Louisville Trade.....	640
Criticisms on the New Cut-Nail Card.....	640
Morley Brothers.....	641
Export Notes.....	641
How to Avoid the Accumulation of Dead Stock.....	642
Prize Competitions.....	642
Screw Manufacture.....	642
Manufacturing.....	643, 648
Standard Hardware Lists.....	643, 644
The Holding Power of Nails.....	643
Catalogue File Case. Illustrated.....	645
Protection to Merchants.....	645
A New Zealand Hardware Merchant's Advertisement.....	645
Keeping Dates of Invoices. Illustrated...	646
Discount for Cash.....	647
Cash or Credit.....	647
Price-Lists, Circulars, &c.....	648
It Is Reported.....	649
Paints and Colors.....	649
Eclipse Self-Measuring Oil Tank. Illus...	650
Improved Revolving Table Bell. Illus...	650
Lightning Band. Illustrated.....	651
Berger's Standing Seam Snowshoe. Illus...	651
Lawn Mower's Partner.....	651
The Boss Eave-Trough Hanger. Illus...	651
Steel Trowel and Weeder. Illustrated...	651
American Tools.....	651
The Old Stock Lock. Illustrated.....	652
Steel Web Picket Fence. Illustrated...	652
West's Perculator. Illustrated.....	652
New Publications.....	652
Current Hardware Prices.....	653
Current Metal Prices.....	660

### Eclipse Self-Measuring Oil Tank.

Wayne Oil Tank Company, Fort Wayne, Ind., are offering the self-measuring device shown in the accompanying illustration. The plunger rod of the pump is attached to a half circle connection, to which the lever is fastened, the object of this arrangement being to enable it to respond with greater ease and better results than a direct movement. The half circle contains the adjustments, which are made by

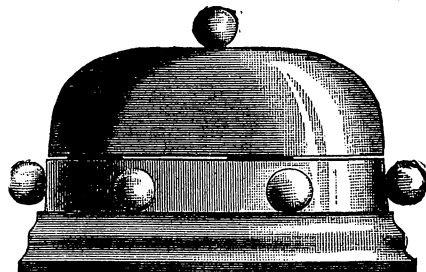


Eclipse Self-Measuring Oil Tank.

means of thumb screws, as shown in the cut. It is explained that the small nuts may be raised or lowered to suit the locality, and that the quart stop is made by simply turning the handle without removing the handle from the lever. It is remarked that the measuring tanks can be made square as well as round, and that the pump cylinder is of seamless brass tubing, the valves of brass, ground air tight, and that all drippings return to the tank. When tanks are made square they are incased in a cabinet. If desired the tank can be placed in the cellar, and the measuring device on the first floor of the store. The point is made that no lamp is needed when drawing oil at night.

### Improved Revolving Table Bell.

The Hardware Specialty Company, Newark, N. J., C. F. Guyon Company, 99 Reade street, New York, agents, are offering the revolving table bell here illustrated. The central portion, to which the knobs are attached, revolves on a pinion attached to the base. When operated, a



Revolving Table Bell.

simple gearing connecting the base and center causes a circular brass plate, to which two loose hammers are attached, to revolve, which, striking against the gong, produces the effects of an electric bell. It has no complicated mechanism, springs or wires to get out of order, requires no winding, and is always ready for use. It is made in two sizes, 3 and 4 inch, and two finishes, nickel plate and quadruple silver plate.

**Lightning Band.**

Buffalo Specialty Mfg. Company, Buffalo, N. Y., are introducing a band for cases and crates, as illustrated herewith. As shown in Fig. 1, the band consists of a metal strip on which are a succession of

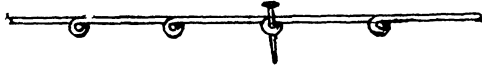


Fig. 1.—Lightning Band.

loops, through which the nails are driven. The band is mounted on reels, from which it is put directly on cases, thus being always ready for use and convenient to handle. The point is made that with the

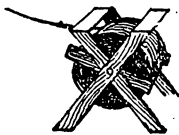
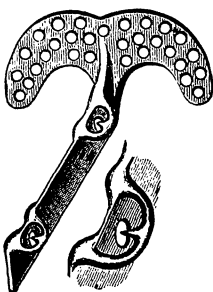


Fig. 2.—Band on Reel.

band in this form crates and cases for shipping may be easily and quickly bound in a neat, strong, and substantial manner.

**Berger's Standing Seam Snowshoe.**

Berger Brothers of 237 Arch street, Philadelphia, Pa., have just brought out a novel device which is intended to do away with either snowrails or gutters formed on roofs to prevent snow from sliding down. The construction of the device is such as to avoid the necessity of boring holes through the metal or in any



Berger's Standing Seam Snowshoe.

way cutting the roof for the purpose of providing suitable fasteners for snowrails. The construction is so clearly illustrated in the accompanying engraving that a lengthy description would appear to be unnecessary. The device is made of malleable iron, and can be clamped directly to the standing seam by the use of an ordinary pair of tongs, the teeth of the side being forced through the seam into corresponding holes on the opposite side. The manufacturers state that when no suitable tongs are conveniently at hand, an ordinary hammer can be employed to bend the clamps into proper position. The manufacturers refer to the standing seam snowshoe as being convenient and economical. The statement is made that if the snowshoes are placed reasonably close together no rails will be necessary.

**Lawn Mower's Partner.**

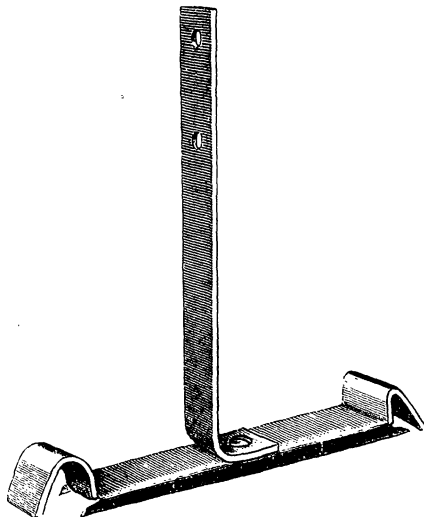
Glennon & Krause, Seventy-sixth and Wallace streets, Chicago, manufacturers of the Lawn Mower's Partner or Grass Carrier, anticipate a very heavy trade in their specialty this season, and are making

ample preparations to handle it. The device won many new friends last year, encouraging the manufacturers to make increased efforts to secure a still wider patronage. This carrier is so made that it will fit any lawn mower up to 20 inches. Above 20 inches a special size is needed, which is, however, furnished at the same

price. The sack is of very large capacity and is so braced that the bottom will not sag when loaded, nor can the wind blow it out of shape, while the bottom is also protected from wear. A circular has been issued giving a number of testimonials from merchants who have handled the carrier. The firm will exhibit a very fine specimen of the Lawn Mower's Partner in Horticultural Hall at the World's Fair. It is claimed that this will be one of the most attractive and elaborate displays in the building. No expense has been spared in preparing for this purpose. Glennon & Krause are also making arrangements, for the benefit of the members of the hardware trade and their friends, in securing World's Fair accommodations for them in advance in good localities, at reasonable rates and without charge for their services.

**The Boss Eave-Trough Hanger.**

In the accompanying illustration we present a new eave-trough hanger—the Boss—which is being placed on the market by Henry B. Todd, Meriden, Conn. This device, which is a new form of the Yankee hanger, and made under the same patent, is offered to meet the demand of the trade for a strong and convenient article, at a low price. It is non-adjustable, and made of soft steel, formed



Boss Eave-Trough Hanger.

in dies under a press. The advantages claimed for the Boss hanger are that it will fit all sizes of beads, and that it has points that penetrate the trough just below the bead, making the attachment to this side of the trough as strong and substantial as the opposite one. The points on both ends of the hanger penetrate the trough from the inside; consequently, the weight of the gutter has a tendency to force it further on to the points; the more weight the stronger being the connection. The hanger is made with straps of assorted lengths, packed in one-gross boxes. Tongs to apply the hangers are also provided.

**Steel Trowel and Weeder.**

A. M. Ross & Co., Ilion, N. Y., are introducing these articles, as illustrated herewith. The garden trowel shown in Fig. 1 is made of steel, and is referred to as of good form, strong and durable. The steel weeder, Fig. 2, allows a person to stand erect when working. By inserting the tapered, half round steel blade into the earth beside a dock, thistle, plantain, daisy or other weed, and then giving the hand a



Fig. 1.—Steel Garden Trowel.



Fig. 2.—Steel Weeder.

quarter turn, it is claimed the weeds and roots may be lifted out clean. The tool is designed for lawn, meadow or garden use.

**American Tools.**

Commenting on the progress made in the manufacture of tools in this country, an English gentleman who arrived in New York late in February, said to be the president of a large railroad syndicate and the possessor of a comfortable fortune, said the other day: "I am amazed beyond measure by what I have learned of your people through the implements they use in the arts and manufactures. In carpenters' and machinists' tools especially I have come across many things that are scarcely known in England. Your tools are much superior to anything we have on the other side, and consequently your artisans do better work and more of it in a given time than ours. Many of our tools are old-fashioned and of the same pattern used a score of years ago, whereas I learn that you are continually improving yours both in shape and quality. I could not believe it until I came here and saw with my own eyes, for you know what insular prejudices we have, but I will say frankly that we could learn a great deal from the Americans. You are far ahead of us in many things. I am delighted as well as amazed at the vast progress seen here. I like your country and shall remain here for a month or two to gain a wider knowledge of your industries. I have bought over £200 worth of tools in New York and shall ship them to my place. When my friends see them they will be as much surprised as I have been." Since his boyhood he has been deeply interested in mechanics, and notwithstanding that for 40 years he was an officer in the British army and often stationed in

out-of-the-way places, he has always had his little shop with him. Since retiring from the army he has devoted much time to making a collection of tools used by workmen at many trades both in England and on the Continent. Numerous inventions of merit find their way to his amateur establishment, where he has his specimens carefully assorted and labeled.

### The Old Stock Lock.

The padlock shown in the accompanying cuts is offered by P. M. Reagan, Chattanooga, Tenn. The lock is made wholly



Fig. 1.—The Old Stock Lock.

of malleable iron, in the shape of a barrel, the rivets joining the halves together being cast on; these making a union, which, it is remarked, is almost impossible to detect when the lock is fitted up. It is coppered on the inside and outside to avoid its being

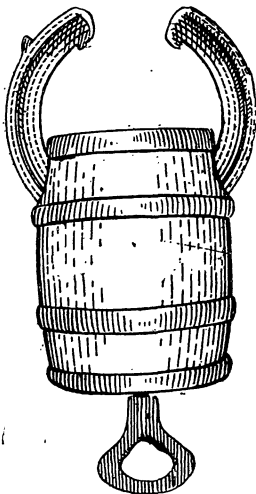


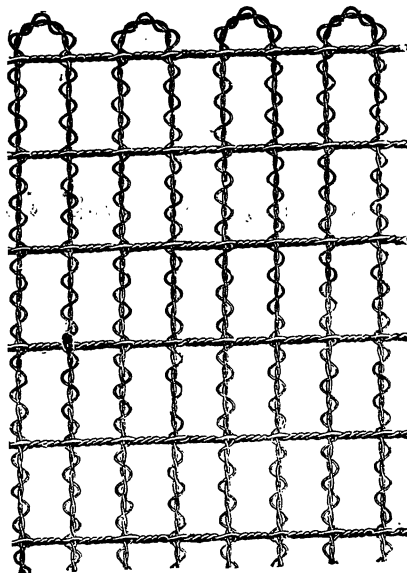
Fig. 2.—The Lock Open.

affected by rust. The manufacturer claims that the construction of the lock is remarkably simple, and that it is impossible to get it out of order. The point is made that it may be made a medium of advertising by the hardware trade, as the name of any firm can be cast to order on the face of the lock.

### Steel Web Picket Fence.

An illustration is herewith given of a new form of steel fence which has been brought out by the De Kalb Fence Company of De Kalb, Ill. The pickets are made of 3 No. 12 steel galvanized wires shaped in a web design. They are uniformly spaced  $2\frac{1}{2}$  inches apart and held firmly in place with well-twisted galvanized steel wires. The pickets, it will be

perceived, are much stiffer than those made of one corrugated wire, while the design is exceedingly handsome. The standard height is six strands, 37 inches

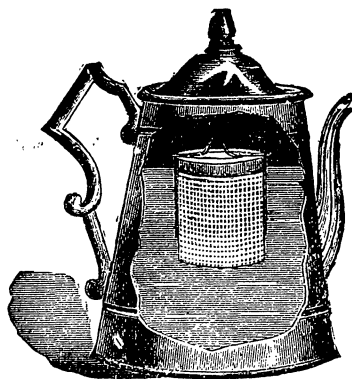


Steel Web Picket Fence.

high, but it is supplied if desired in different heights, varying from 18 to 50 inches. It is compactly rolled for shipping, the standard roll containing 300 feet.

### West's Percolator.

T. G. Ellsworth, 85 Chambers and 67 Reade streets, New York, is offering the percolator, as illustrated herewith. It consists of a perforated metal basket, with a hollow air tight cover, which causes the percolator to float. Lugs fastened on the edge of the cover turn under stationary ears soldered to the basket, holding the cover in place. A ring is soldered on the cover by which the percolator is removed from the hot liquid. The sheets of which the basket is made are tinned after being perforated, thus covering the raw edges and avoiding rust and discoloration of the coffee. The basket has a swage a little more than half way up to indicate how much coffee should be put in, the space above being left for the water to percolate through. It is explained that in use the float holds the percolator at the surface, where the agitation of boiling water is the greatest, and that the action of the water forces out all the strength of the coffee. The point is made that the



West's Percolator.

percolator saves the trouble and cost of eggs for clarifying, keeps the grounds from sticking on sides of the pot, clogging the spout, coming into the cup, and a thousand and one annoyances there are in putting the coffee loose into the pot. The percolator is made in four sizes, to make from 12 to 36 cups of coffee.

### NEW PUBLICATIONS.

AMERICAN NEWSPAPER ANNUAL. N. W. Ayer & Son, Philadelphia. Price \$5.

The "American Newspaper Annual" for 1892 is the thirteenth edition of this valuable compilation of the newspapers and periodicals published in the United States and Canada, and shows that the development of journalism, press and class, is keeping pace with the growth of population and increase in intellectual and industrial progress.

The work under review is not only a catalogue of newspapers, giving information concerning their circulation, issue, date of establishment, political and other distinctive features, together with the population of the counties and places in which the papers are published, but it also furnishes a description of every place in the United States and Canada in which a newspaper is published, including railroad, telegraph, express and banking facilities, thus forming a valuable guide to advertisers and the public in general.

Some interesting information is presented regarding the growth of journalism in this country. In the present edition, 20,115 newspapers and periodicals are enumerated, an increase over last year of 1104. It is stated that the increase is due partly to the average yearly net gains of from 800 to 850 and partly to the fact that the Presidential election always adds temporarily to the number of papers. In 1879, according to best authority, the number of papers in existence was 10,115, or exactly 10,000 less than the present count. In the ten years since 1882 the average net annual increase has been 831. These figures, however, it is stated, give no idea of the number of papers started in any one year. Probably not less than 3500 publications of all kinds have sprung into existence since work on the edition of 1891 was closed, but of over 3000 recorded many ceased publication with the first or a very early issue.

There were published in the United States in 1892 14,204 weekly, 2188 monthly and 1806 daily papers. New York leads, with 1902, followed by Illinois, with 1572; Pennsylvania, with 1384; Ohio, with 1112, and Iowa, with 975.

The "American Newspaper Annual" embraces 1426 pages of descriptive, statistical, advertising and miscellaneous matter, and the method of indexing employed makes it possible to turn to the information desired without loss of time.

POOR'S HANDBOOK OF INVESTMENT SECURITIES, 1891-93. H. V. & H. W. Poor, New York.

As an illustration of the vast amount of capital invested in the United States in railroads, industrial enterprises, loans, &c., the third annual Handbook of Investment Securities, issued by H. V. & H. W. Poor of New York, is very striking. A great mass of valuable information in regard to securities issued by the United States, by the several States and by municipal bodies and railroad companies, together with a statement of the condition of banks and other corporate bodies throughout the country, make the volume one of worth to business men and investors, who can from its pages obtain a knowledge of the status of any corporation in the country. An interesting and surprising fact brought out by the work is that there are 25,000 classes of obligations issued by various corporate bodies in the United States, the gross amount of which foots up some \$15,000,000,000. The book is embellished with a series of colored county and railroad maps of every State of the Union.

# Current Hardware Prices.

MARCH 15, 1893.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

The character @ is used to indicate a range of price; thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

## Adjusters, Blind—

Domestic..... \$ doz \$3.00, 33%  
Excelsior..... \$ doz \$10.00..... 50&10&25  
North's..... list net @ 10%  
Zimmerman's—See Fasteners Blind.

## Ammunition—See Caps, Cartridges, Shells, &c

## Anvils—

Eagle Anvils, \$ 96..... 15@15&5%  
Peter Wright's..... 11@11%  
Armstrong's Mouse Hole..... 10%  
Am. Wrought, Horse shoe brand, 11@11%  
Trenton..... 10@10%  
Wilkinson's..... 10%  
Moore & Barnes Mfg. Co..... 33%

## Anvil Vise and Drill—

Millers Falls Co., \$18.00..... 20%  
Cheney Anvil and Vise..... 25%  
Allen Anvil and Vise \$3.00..... 40&10%  
Star..... 45&5%

## Apple Parers—See Parers Apple, &c.

## Augers and Bits—

Douglas Mfg. Co..... See Trade Report.  
Wm. A. Ives & Co..... See Trade Report.  
Humphreysville Mfg. Co..... See Trade Report.  
French, Swift & Co. (F. H. Beecher)..... See Trade Report.  
P. S. & W. Co..... See Trade Report.  
Rockford Bit Company..... See Trade Report.  
Cook's, Douglas Mfg. Co..... See Trade Report.  
Cook's, N. H. Copper Co..... See Trade Report.  
Ives' Circular Lip..... 60%  
Patent Solid Head..... 30%  
C. E. Jennings & Co., No. 10, extension..... 40%  
Up..... 60%  
C. E. Jennings & Co., No. 30..... 60%  
C. E. Jennings & Co., Auger Bits, \$ set, 32 1/4, quarters, No. 5, \$5; No. 30, \$3.50..... 45%  
Lewis' Patent Single..... 45%  
Russell Jennings' Augers and Bits, 25&10%  
Imitation Jennings' Bits..... See Trade Report

Pugh's Black..... 20%  
Pugh's Jennings Pattern..... 30%  
Car Bits..... 60&10%  
Car Bits, P. S. & W. Co..... 60%  
Snell's Car Bits..... 60%  
L'Hommedieu Car Bits..... 15&10%  
Worthington Pat. Auger Bits..... 20%  
Cincinnati Bell-Hangers' Bits..... 30&10

## Bit Stock Drills—

Morse Twist Drills..... 50&10&5%  
Standard..... 50&10&5%  
Cleveland..... 50&10&5%  
Syracuse, for metal..... 50&10%  
Syracuse, for wood (wood list)..... 30&10&5%  
Cincinnati, for wood..... 30&10%  
Cincinnati, for metal..... 45&10%

## Expansive Bits—

Clark's small, \$18; large, \$20..... 35&35&10%  
Ives' No. 4, \$ doz \$90..... 40%  
Swan's..... 40%  
Stearns, No. 1, \$2; No. 2, \$2.25..... 35%  
Stearns' No. 2, \$48..... 20%

## Gimlet Bits—

Common..... \$ gross \$2.75@3.25  
Diamond..... \$ doz \$1.25..... 40&10%  
See..... 25&25&5%  
Double Cut, Sheppardson's..... 45&45&10%  
Double Cut, Ct. Valley Mfg. Co..... 30&10%  
Double Cut, Hartwell's, \$ gro., \$5.00..... 25%  
Double Cut, Douglass..... 40&10%  
Double Cut, Ives..... 60&60&10%

## Hollow Augers—

Ives'..... 33%  
French, Swift & Co..... 10%  
Douglas..... 10%  
Bonney's Adjustable, \$ doz \$48..... 60%  
Stearns'..... 20&10%  
Ives' Expansive, each \$4.50..... 60&5%  
Universal Expansive, each \$4.50..... 20%  
Wood's..... 25&25&10%  
Cincinnati Adjustable..... 25&10%  
Cincinnati Standard..... 25&10%

## Ship Augers and Bits—

L'Hommedieu's..... 15&10&15&10&5%  
Watrous..... 25&25&10%  
Snell's..... 15&10&15&10&5%  
Snell's Ship Auger Pattern Car Bits..... 15&10&15&10&5%

## Awl Hafts—See Hafts, Awl.

## Awls—

Awls, Sewing, Common..... \$ gr. 85¢@90¢  
Awls, Should. Peg..... \$ gr. \$1.50@1.55  
Awls, Pat. Peg..... \$ gr. 35¢@38¢  
Awls, Shouldered Brad..... \$ gr. \$1.30@1.40  
Awls, Handled Brad..... \$ gr. \$2.50@3.00  
Awls, Handled Scratch..... \$ gr. \$4.00@4.50  
Awls, Socket Scratch..... \$ doz. \$1.10@1.20

## Awl and Tool Sets—See Sets, Awl and Tool.

## Axes—

First quality, best brands, \$7.00..... Beveled..... \$7.50  
First quality, other brands..... 6.50  
Second quality..... 5.50  
Second quality..... 6.00

## Axle Grease—See Grease, Axle.

## Axles—

No. 1..... 3%  
No. 7 to 14..... 60&10%  
No. 15 to 18..... 47%  
No. 19 to 22..... 70%  
Concord Axles, loose collar..... 4%  
Concord Axles, solid collar..... 5%  
National Tubular Self Oiling..... 33%  
No. 2, 5¢@6%  
No. 1, 4%  
No. 3, 5%  
No. 4, 6%  
No. 5, 7%  
No. 6, 8%  
No. 7, 9%  
No. 8, 10%  
No. 9, 11%  
No. 10, 12%  
No. 11, 13%  
No. 12, 14%  
No. 13, 15%  
No. 14, 16%  
No. 15, 17%  
No. 16, 18%  
No. 17, 19%  
No. 18, 20%  
No. 19, 21%  
No. 20, 22%  
No. 21, 23%  
No. 22, 24%  
No. 23, 25%  
No. 24, 26%  
No. 25, 27%  
No. 26, 28%  
No. 27, 29%  
No. 28, 30%  
No. 29, 31%  
No. 30, 32%  
No. 31, 33%  
No. 32, 34%  
No. 33, 35%  
No. 34, 36%  
No. 35, 37%  
No. 36, 38%  
No. 37, 39%  
No. 38, 40%  
No. 39, 41%  
No. 40, 42%  
No. 41, 43%  
No. 42, 44%  
No. 43, 45%  
No. 44, 46%  
No. 45, 47%  
No. 46, 48%  
No. 47, 49%  
No. 48, 50%  
No. 49, 51%  
No. 50, 52%  
No. 51, 53%  
No. 52, 54%  
No. 53, 55%  
No. 54, 56%  
No. 55, 57%  
No. 56, 58%  
No. 57, 59%  
No. 58, 60%  
No. 59, 61%  
No. 60, 62%  
No. 61, 63%  
No. 62, 64%  
No. 63, 65%  
No. 64, 66%  
No. 65, 67%  
No. 66, 68%  
No. 67, 69%  
No. 68, 70%  
No. 69, 71%  
No. 70, 72%  
No. 71, 73%  
No. 72, 74%  
No. 73, 75%  
No. 74, 76%  
No. 75, 77%  
No. 76, 78%  
No. 77, 79%  
No. 78, 80%  
No. 79, 81%  
No. 80, 82%  
No. 81, 83%  
No. 82, 84%  
No. 83, 85%  
No. 84, 86%  
No. 85, 87%  
No. 86, 88%  
No. 87, 89%  
No. 88, 90%  
No. 89, 91%  
No. 90, 92%  
No. 91, 93%  
No. 92, 94%  
No. 93, 95%  
No. 94, 96%  
No. 95, 97%  
No. 96, 98%  
No. 97, 99%  
No. 98, 100%  
No. 99, 101%  
No. 100, 102%  
No. 101, 103%  
No. 102, 104%  
No. 103, 105%  
No. 104, 106%  
No. 105, 107%  
No. 106, 108%  
No. 107, 109%  
No. 108, 110%  
No. 109, 111%  
No. 110, 112%  
No. 111, 113%  
No. 112, 114%  
No. 113, 115%  
No. 114, 116%  
No. 115, 117%  
No. 116, 118%  
No. 117, 119%  
No. 118, 120%  
No. 119, 121%  
No. 120, 122%  
No. 121, 123%  
No. 122, 124%  
No. 123, 125%  
No. 124, 126%  
No. 125, 127%  
No. 126, 128%  
No. 127, 129%  
No. 128, 130%  
No. 129, 131%  
No. 130, 132%  
No. 131, 133%  
No. 132, 134%  
No. 133, 135%  
No. 134, 136%  
No. 135, 137%  
No. 136, 138%  
No. 137, 139%  
No. 138, 140%  
No. 139, 141%  
No. 140, 142%  
No. 141, 143%  
No. 142, 144%  
No. 143, 145%  
No. 144, 146%  
No. 145, 147%  
No. 146, 148%  
No. 147, 149%  
No. 148, 150%  
No. 149, 151%  
No. 150, 152%  
No. 151, 153%  
No. 152, 154%  
No. 153, 155%  
No. 154, 156%  
No. 155, 157%  
No. 156, 158%  
No. 157, 159%  
No. 158, 160%  
No. 159, 161%  
No. 160, 162%  
No. 161, 163%  
No. 162, 164%  
No. 163, 165%  
No. 164, 166%  
No. 165, 167%  
No. 166, 168%  
No. 167, 169%  
No. 168, 170%  
No. 169, 171%  
No. 170, 172%  
No. 171, 173%  
No. 172, 174%  
No. 173, 175%  
No. 174, 176%  
No. 175, 177%  
No. 176, 178%  
No. 177, 179%  
No. 178, 180%  
No. 179, 181%  
No. 180, 182%  
No. 181, 183%  
No. 182, 184%  
No. 183, 185%  
No. 184, 186%  
No. 185, 187%  
No. 186, 188%  
No. 187, 189%  
No. 188, 190%  
No. 189, 191%  
No. 190, 192%  
No. 191, 193%  
No. 192, 194%  
No. 193, 195%  
No. 194, 196%  
No. 195, 197%  
No. 196, 198%  
No. 197, 199%  
No. 198, 200%  
No. 199, 201%  
No. 200, 202%  
No. 201, 203%  
No. 202, 204%  
No. 203, 205%  
No. 204, 206%  
No. 205, 207%  
No. 206, 208%  
No. 207, 209%  
No. 208, 210%  
No. 209, 211%  
No. 210, 212%  
No. 211, 213%  
No. 212, 214%  
No. 213, 215%  
No. 214, 216%  
No. 215, 217%  
No. 216, 218%  
No. 217, 219%  
No. 218, 220%  
No. 219, 221%  
No. 220, 222%  
No. 221, 223%  
No. 222, 224%  
No. 223, 225%  
No. 224, 226%  
No. 225, 227%  
No. 226, 228%  
No. 227, 229%  
No. 228, 230%  
No. 229, 231%  
No. 230, 232%  
No. 231, 233%  
No. 232, 234%  
No. 233, 235%  
No. 234, 236%  
No. 235, 237%  
No. 236, 238%  
No. 237, 239%  
No. 238, 240%  
No. 239, 241%  
No. 240, 242%  
No. 241, 243%  
No. 242, 244%  
No. 243, 245%  
No. 244, 246%  
No. 245, 247%  
No. 246, 248%  
No. 247, 249%  
No. 248, 250%  
No. 249, 251%  
No. 250, 252%  
No. 251, 253%  
No. 252, 254%  
No. 253, 255%  
No. 254, 256%  
No. 255, 257%  
No. 256, 258%  
No. 257, 259%  
No. 258, 260%  
No. 259, 261%  
No. 260, 262%  
No. 261, 263%  
No. 262, 264%  
No. 263, 265%  
No. 264, 266%  
No. 265, 267%  
No. 266, 268%  
No. 267, 269%  
No. 268, 270%  
No. 269, 271%  
No. 270, 272%  
No. 271, 273%  
No. 272, 274%  
No. 273, 275%  
No. 274, 276%  
No. 275, 277%  
No. 276, 278%  
No. 277, 279%  
No. 278, 280%  
No. 279, 281%  
No. 280, 282%  
No. 281, 283%  
No. 282, 284%  
No. 283, 285%  
No. 284, 286%  
No. 285, 287%  
No. 286, 288%  
No. 287, 289%  
No. 288, 290%  
No. 289, 291%  
No. 290, 292%  
No. 291, 293%  
No. 292, 294%  
No. 293, 295%  
No. 294, 296%  
No. 295, 297%  
No. 296, 298%  
No. 297, 299%  
No. 298, 300%  
No. 299, 301%  
No. 300, 302%  
No. 301, 303%  
No. 302, 304%  
No. 303, 305%  
No. 304, 306%  
No. 305, 307%  
No. 306, 308%  
No. 307, 309%  
No. 308, 310%  
No. 309, 311%  
No. 310, 312%  
No. 311, 313%  
No. 312, 314%  
No. 313, 315%  
No. 314, 316%  
No. 315, 317%  
No. 316, 318%  
No. 317, 319%  
No. 318, 320%  
No. 319, 321%  
No. 320, 322%  
No. 321, 323%  
No. 322, 324%  
No. 323, 325%  
No. 324, 326%  
No. 325, 327%  
No. 326, 328%  
No. 327, 329%  
No. 328, 330%  
No. 329, 331%  
No. 330, 332%  
No. 331, 333%  
No. 332, 334%  
No. 333, 335%  
No. 334, 336%  
No. 335, 337%  
No. 336, 338%  
No. 337, 339%  
No. 338, 340%  
No. 339, 341%  
No. 340, 342%  
No. 341, 343%  
No. 342, 344%  
No. 343, 345%  
No. 344, 346%  
No. 345, 347%  
No. 346, 348%  
No. 347, 349%  
No. 348, 350%  
No. 349, 351%  
No. 350, 352%  
No. 351, 353%  
No. 352, 354%  
No. 353, 355%  
No. 354, 356%  
No. 355, 357%  
No. 356, 358%  
No. 357, 359%  
No. 358, 360%  
No. 359, 361%  
No. 360, 362%  
No. 361, 363%  
No. 362, 364%  
No. 363, 365%  
No. 364, 366%  
No. 365, 367%  
No. 366, 368%  
No. 367, 369%  
No. 368, 370%  
No. 369, 371%  
No. 370, 372%  
No. 371, 373%  
No. 372, 374%  
No. 373, 375%  
No. 374, 376%  
No. 375, 377%  
No. 376, 378%  
No. 377, 379%  
No. 378, 380%  
No. 379, 381%  
No. 380, 382%  
No. 381, 383%  
No. 382, 384%  
No. 383, 385%  
No. 384, 386%  
No. 385, 387%  
No. 386, 388%  
No. 387, 389%  
No. 388, 390%  
No. 389, 391%  
No. 390, 392%  
No. 391, 393%  
No. 392, 394%  
No. 393, 395%  
No. 394, 396%  
No. 395, 397%  
No. 396, 398%  
No. 397, 399%  
No. 398, 400%  
No. 399, 401%  
No. 400, 402%  
No. 401, 403%  
No. 402, 404%  
No. 403, 405%  
No. 404, 406%  
No. 405, 407%  
No. 406, 408%  
No. 407, 409%  
No. 408, 410%  
No. 409, 411%  
No. 410, 412%  
No. 411, 413%  
No. 412, 414%  
No. 413, 415%  
No. 414, 416%  
No. 415, 417%  
No. 416, 418%  
No. 417, 419%  
No. 418, 420%  
No. 419, 421%  
No. 420, 422%  
No. 421, 423%  
No. 422, 424%  
No. 423, 425%  
No. 424, 426%  
No. 425, 427%  
No. 426, 428%  
No. 427, 429%  
No. 428, 430%  
No. 429, 431%  
No. 430, 432%  
No. 431, 433%  
No. 432, 434%  
No. 433, 435%  
No. 434, 436%  
No. 435, 437%  
No. 436, 438%  
No. 437, 439%  
No. 438, 440%  
No. 439, 441%  
No. 440, 442%  
No. 441, 443%  
No. 442, 444%  
No. 443, 445%  
No. 444, 446%  
No. 445, 447%  
No. 446, 448%  
No. 447, 449%  
No. 448, 450%  
No. 449, 451%  
No. 450, 452%  
No. 451, 453%  
No. 452, 454%  
No. 453, 455%  
No. 454, 456%  
No. 455, 457%  
No. 456, 458%  
No. 457, 459%  
No. 458, 460%  
No. 459, 461%  
No. 460, 462%  
No. 461, 463%  
No. 462, 464%  
No. 463, 465%  
No. 464, 466%  
No. 465, 467%  
No. 466, 468%  
No. 467, 469%  
No. 468, 470%  
No. 469, 471%  
No. 470, 472%  
No. 471, 473%  
No. 472, 474%  
No. 473, 475%  
No. 474, 476%  
No. 475, 477%  
No. 476, 478%  
No. 477, 479%  
No. 478, 480%  
No. 479, 481%  
No. 480, 482%  
No. 481, 483%  
No. 482, 484%  
No. 483, 485%  
No. 484, 486%  
No. 485, 487%  
No. 486, 488%  
No. 487, 489%  
No. 488, 490%  
No. 489, 491%  
No. 490, 492%  
No. 491, 493%  
No. 492, 494%  
No. 493, 495%  
No. 494, 496%  
No. 495, 497%  
No. 496, 498%  
No. 497, 499%  
No. 498, 500%  
No. 499, 501%  
No. 500, 502%  
No. 501, 503%  
No. 502, 504%  
No. 503, 505%  
No. 504, 506%  
No. 505, 507%  
No. 506, 508%  
No. 507, 509%  
No. 508, 510%  
No. 509, 511%  
No. 510, 512%  
No. 511, 513%  
No. 512, 514%  
No. 513, 515%  
No. 514, 516%  
No. 515, 517%  
No. 516, 518%  
No. 517, 519%  
No. 518, 520%  
No. 519, 521%  
No. 520, 522%  
No. 521, 523%  
No. 522, 524%  
No. 523, 525%  
No. 524, 526%  
No. 525, 527%  
No. 526, 528%  
No. 527, 529%  
No. 528, 530%  
No. 529, 531%  
No. 530, 532%  
No. 531, 533%  
No. 532, 534%  
No. 533, 535%  
No. 534, 536%  
No. 535, 537%  
No. 536, 538%  
No. 537, 539%  
No. 538, 540%  
No. 539, 541%  
No. 540, 542%  
No. 541, 543%  
No. 542, 544%  
No. 543, 545%  
No. 544, 546%  
No. 545, 547%  
No. 546, 548%  
No. 547, 549%  
No. 548, 550%  
No. 549, 551%  
No. 550, 552%  
No. 551, 553%  
No. 552, 554%  
No. 553, 555%  
No. 554, 556%  
No. 555, 557%  
No. 556, 558%  
No. 557, 559%  
No. 558, 560%  
No. 559, 561%  
No. 560, 562%  
No. 561, 563%  
No. 562, 564%  
No. 563, 565%  
No. 564, 566%  
No. 565, 567%  
No. 566, 568%  
No. 567, 569%  
No. 568, 570%  
No. 569, 571%  
No. 570, 572%  
No. 571, 573%  
No. 572, 574%  
No. 573, 575%  
No. 574, 576%  
No. 575, 577%  
No. 576, 578%  
No. 577, 579%  
No. 578, 580%  
No. 579, 581%  
No. 580, 582%  
No. 581, 583%  
No. 582, 584%  
No. 583, 585%  
No. 584, 586%  
No. 585, 587%  
No. 586, 588%  
No. 587, 589%  
No. 588, 590%  
No. 589, 591%  
No. 590, 592%  
No. 591, 593%  
No. 592, 594%  
No. 593, 595%  
No. 594, 596%  
No. 595, 597%  
No. 596, 598%  
No. 597, 599%  
No. 598, 600%  
No. 599, 601%  
No. 600, 602%  
No. 601, 603%  
No. 602, 604%  
No. 603, 605%  
No. 604, 606%  
No. 605, 607%  
No. 606, 608%  
No. 607, 609%  
No. 608, 610%  
No. 609, 611%  
No. 610, 612%  
No. 611, 613%  
No. 612, 614%  
No. 613, 615%  
No. 614, 616%  
No. 615, 617%  
No. 616, 618%  
No. 617, 619%  
No. 618,



**Chalk Lines—See Lines.****Chisels—****Socket Framing and Firmer**

P. S. & W.	
New Haven	
Witherby	
Mix	
Ohio Tool Co.	
Douglas	
Buck Bros.	
Merrill	
L. & J. White	

**Tanged and Miscellaneous.**

Tanged Firmers	
Butchers	
Spears & Jackson's	
Buck Bros.	
Cold Chisels, P. S.	

**Chucks—**

Beach Pat.	
Morse's Adjustable	
Danbury	
Syracuse, Balz Pat.	
Graham Patent	
Minner's Patent Chucks	
Combination Lathe Chucks	
Universal Lathe Chucks	
Independent Lathe Chucks	
Drill Chucks	
Union Mfg. Co.	
Victor	
Combination	
Universal	
Independent	

**Churns—**

Twin Union, each, 5 gal.	
McDermid Star Barrel Churn, each	
6 gal.	
20 gal.	

**Clamps—**

R. I. Tool Co.'s Wrought Iron	
Adjustable, Cincinnati	
Adjustable, Hammers	
Adjustable, Stearn's	
Stearns' Adjustable Cabinet and Cor-	
ner	
Cabinet, Sargent's	
Carriage Makers', Sargent's	
Carriage Makers', P. S. & W. Co.	
Eberhard Mfg. Co.	
Warner's	
Saw Clamps, see Vises, Saw Filers	
Carpenter's, Cincinnati	

**Cleavers, Butchers—**

Bradley's	
L. & J. White	
Beatty's	
New Haven Edge Tool Co.	
P. S. & W.	
Foster Bros.	
Schulte, Lohoff & Co.	

**Clips—**

Norway, Axle, 1/4 & 5-16	
2d grade Norway Axle, 1/4 & 5-16	
Superior Axle Clips	
Norway Spring Bar Clips	
Wrought Iron Felloe Clips	
Steel Felloe Clips	
Baker Axle Clips	

**Cloth and Netting, Wire****Cockeyes****Cocks Brass—****Coffee Mills—See Mills, Coffee.****Collars, Dog—**

Chapman Mfg. Company	
Medford Fancy Goods Co.	
Embossed, Gift, Pope & Steven's list	
Leather, Pope & Steven's list	
Brass, Pope & Steven's list	

**Combs, Curry—**

Rubber, per doz.	
American Curry Comb Co.	
Kohler's Magic Oscillating	
Kohler's Humane	

**Compasses, Dividers, &c.**

Compass, Dividers, Dividers	
Bemis & Call Co.	
Dividers	
Compasses	
Calipers, Wing and Inside or Outside	
Calipers, Double	
Calipers, Call's Patent Inside	
Excelsior	
J. Stevens & Co.'s	
Starrett's	
Spring Calipers and Dividers	
Lock Calipers and Dividers	
Combination Dividers	

**Coolers, Water—**

S. S. & Co., 2-gal.	
3-gal.	
4-gal.	
5-gal.	

**Coopers' Tools—****Cord—**

common	
Patent, good quality	
White Cotton Braided, fair	
Common Russia Sash	
Patent Russia Sash	
Cable Laid Italian Sash	
India Cable Laid Sash	
Silver Lake	

**Crackers, Nut—**

Table (H. & B. Mfg. Co.)	
Blake's Pattern, # doz.	
Turner & Seymour Mfg. Co.	
Acme	
Japanned, # gro.	
Nickel Plated, # gro.	

**Cradles—****Crays—**

White Crays, # gross	
D. M. Stewart Mfg. Co. Metal Work-	
ers', # gross	
D. M. Stewart Mfg. Co. Rolling Mill	
# gross	

**Creamery Pails—See Pails, Creamery.****Crow Bars—See Bars, Crow.****Curry Combs—****Curtain Pins—****Cutters—****Meat—****Dixon's, # doz.****Woodruff's, # doz.****Hale's Pattern, # doz.****American, # doz.****Each, # doz.**



**Halters—**

Covert's Rope, Jute.....60&10&10&2%  
Covert's Rope, 7-16 in. Jute.....70&2%  
Covert's Rope, 1/4 in. Hemp.....50&2%  
Covert's Ad. Rope Halters.....40&2%  
Covert's Hemp Horse and Cattle Tie.....50&10&2%  
Covert's Jute Horse Ties.....70&2%  
Covert's Jute Cattle Ties.....70&10&2%  
Covert's Ad. Web Halters.....35&5&2%  
Covert's Saddlery Works Halters.....33&4%  
Covert's Saddlery Works Horse and Cattle Ties.....33&4%

**Hammers—****Handled Hammers—**

Maydole's, list Dec. 1, '85.....25&10&35%  
Buffalo Hammer Co.....50&10%  
Humason & Beckley.....50&10%  
Cha Tool Co.....50&10%  
Verree.....40&10%  
C. Hammond & Son.....40&10%  
Fayette R. Plumb.....40&10%  
Artisan's Choice, A. E. Nail.....40&10%  
Regular Y. & P., A. E. Nail.....50%  
Horsehoe Turning Hammers.....50%  
Other Hammers.....50&10%  
Cheney's Claw.....40&10%  
Cheney's Machinist's Riveting.....50&5%  
Magnetic Tack, Nos. 1, 2, 3, \$1.25, 1.50 & 1.75.....30&10%  
Nelson Tool Works.....40&10%  
Warner & Nobles, new list.....35&40%  
Peck, Stow & Wilcox.....35&40%  
Sargent's.....40&10%

**Heavy Hammers and Sledges—**

3 lb and under.....\$4.00 } 75&10&75&10  
3 to 5 lb.....\$3.00 } 65%  
Over 5 lb.....\$3.00 } 65%  
Wilkinson's Smiths.....10&40&11&2%

**Handcuffs and Leg Irons**

—See Police Goods.

**Handles—****Cross-Cut Saw Handles—**

Ackins', new list.....40%  
Champion.....15%  
Ely's Perfection.....\$ doz. \$3.00

**Iron, Wrought or Cast—**

Door or Thumb.....  
Nos.....0 1 2 3 4  
Per doz.....\$0.90 1.00 1.08 1.35 1.50  
Roggin's Latches.....\$ doz 30&35%  
Bronze Iron Drop Latches.....\$ doz 70&100%  
Jap'd Store Door Handles—Nuts, \$1.62;  
Plate, \$1.10; no plate, \$0.88.....net  
Barn Door.....\$ doz \$1.40.....10&10%  
Chest and Lifting.....70&70&10%

**Wood—**

Saw and Plane.....40&10&50%  
Hammer, Hatchet, Axe, &c.....40&40&5%  
Brad Axl.....40&40&5%  
Hickory Firmer Chisel, ass'd.....\$ gr \$2.00  
Hickory Firmer Chisel, large.....\$ gr 5.00  
Apple Firmer Chisel, ass'd.....\$ gr 5.00  
Apple Firmer Chisel, large.....\$ gr 6.00  
Socket Firmer Chisel, ass'd.....\$ gr 3.00  
Socket Framing Chisel, ass'd.....\$ gr 5.00  
J. B. Smith & Co.'s Pat File.....50%  
File, assorted.....\$ gr 2.75  
Auger, assorted.....\$ gr 5.00  
Auger, large.....\$ gr 7.00  
Pat. Auger, Ives'.....30&10%  
Pat. Auger, Douglass.....\$ set \$1.25  
Pat. Auger, Swan's.....\$ set \$1.00  
Hoe, Rake, Shovel, &c.....60&60&5%

**Hangers—**

Barn Door, old patterns.....70&70&4%  
Barn Door, New England.....70&70&5%  
Samson Steel Anti-Friction.....55%  
Orleans Steel.....50&10%  
Hamilton Wrought Steel Track.....55%  
Champion.....60&10%  
Climax Anti-Friction.....55%  
Zenith for Wood Track.....55%  
Sterling.....50&10&60%  
Victor, No. 1, \$15.00; No. 2, \$16.50; No. 3, \$18.00.....50&2%  
Kiddler's.....50&50&10%  
Boss.....60&10&60&10&5%  
Best Anti-Friction.....60&10&60&10&5%  
Duplex (Wood Track).....60&10&5%  
Terry's Modern.....50&10&50&10&5%  
Terry's Ideal.....50&10&50&10&5%  
Terry's Solid.....50&10&60%  
Terry's Shield.....50&10&60%  
Terry's Wrought Single Strap.....50&10%  
Cronk's Patent, Steel Covered.....50&10%  
Carrier Steel Anti-Friction.....50&10%  
Richards'.....30&30&10%  
Lane's New Standard.....50&50&5%  
Lane's Standard.....50&50&5%  
Lane's Parlor.....40%  
Warner's Pat.....20&10&10%  
Stearns' Anti-Friction.....20&10&10%  
Stearns' Challenge.....25&10&10%  
Cincinnati, Nos. 1, \$2.25; 3, \$2.50; 4, \$2.60.....20&10%  
Paragon, Nos. 5, 5 1/2, 7 and 8.....20&10%  
Crescent.....60&60&10%  
Nickel, Steel, Nos. 0, \$25; 1, \$20; 2, \$15.....40&10&50%  
Chicago Anti-Friction.....30&10%  
Star.....40&10&40&10&5%  
Barry.....50&10%  
Interstate.....50&10%  
Pendulum, Payson's.....40&40&10%  
Woody.....45%  
Economy, \$6.00.....50&10%

**Harness Snaps—See Snaps.****Hatchets—**

American Axe and Tool Co.....  
Blood's.....  
Hunt's.....  
Hurd's.....  
Mann's.....  
Peck's.....  
Underhill's.....40 & 10  
Buffalo Hammer Co.....50&5%  
Fayette R. Plumb.....  
C. Hammond & Son.....  
Kelly's.....  
Sargent's & Co.....  
P. S. & W. Co.....  
Ten Eyck Edge Tool Co.....10%  
Schulte, Lohoff & Co.....50&50&5%

**Hay and Straw Knives—**

See Knives.

**Hinges—****Blind Hinges—**

Parker.....75&2%  
Huffer.....50%  
Clark's, Nos. 1, 3, 5, 40 and 60.....80&80&5%  
Clark's Mortise Gravity.....50%  
Sargent's, Nos. 1, 3, 5, 11, 12, 13, 75&10&10%  
Reading's Gravity.....75&10&75&10&5%  
Shepard's.....75&10%  
Noiseless.....75&10%  
Niagara.....80%  
Buffalo.....80%  
Clark's Genuine Pattern.....75&10%  
O. S. Lull & Porter.....75%  
Acme, Lull & Porter.....75%  
Queen City Reversible.....70&10&5%  
Clark's, Lull & Porter, Nos. 0, 1, 1 1/2, 2, 2 1/2, 3.....75&10&5%  
North's Automatic Blind Fixtures, No. 2 for Wood, \$9.00; No. 3 for Brick, \$11.50.....10%

**Gate Hinges—**

Western.....\$ doz \$4.20, 60&60&10%  
N. E.....\$ doz \$7.80, 60&60&10%  
N. E. Reversible.....\$ doz. \$5.60, 60&60&10%  
Clark's, Nos. 1, 2, 3.....60&10&5%  
N. Y. State.....\$ doz \$4.90, 60&60&10%  
Automatic.....\$ doz \$12.50, 50%  
Shepard's.....60&10&5%

**Spring Hinges—**

Geer's Spring and Blank Butts.....40%  
Union Spring Hinge Co's list, March, 1886.....20%  
Barker's Double Acting.....25%  
Union Mfg. Co.....25%  
Bommer's.....30%  
Buckman's.....15&20%  
Chicago.....30%  
Bardsley's Patent Checking.....15%  
Acme.....30%  
U. S.....25&10%  
Empire and Crown.....20%  
Hero and Monarch.....20%  
American, Gem and Star.....20%  
Oxford.....20%  
Royal.....60&2%  
Reifable.....60%  
Champion.....60%  
No. 10 Matchless.....60%  
No. 25 Unbreakable.....60%  
J. G. C. Covered, \$ gr. \$30.....50&5%  
Samson.....60&60&1%  
Wiles, No. 1, \$ gr. \$16; No. 2, \$13  
Devore, No. 1.....\$ gr. \$13.00  
Rex.....\$ gr. \$13.00  
Preport.....\$ gr. \$12.00  
Stearns' Noiseless Floor Hinge, \$ set \$5.00.....20&10&30%

**Wrought Iron Hinges—**

List February 14, 1891.  
Strap and T.....50&10&50&10&5%  
Corrugated Strap and T.....50&10&5%  
Screw Hook and.....6 to 12 in., \$ m. 4¢  
Strap.....14 to 20 in., \$ m. 3¢  
Strap.....22 to 36 in., \$ m. 3¢  
Screw Hook and Eye.....1/4 in., \$ m. 7 1/2¢  
1/2 in., \$ m. 5 1/2¢  
3/4 in., \$ m. 4 1/2¢  
Rolled Blind Hinges, Nos. 32 and 34.....50&10%  
Rolled Blind Hinges, Nos. 232 and 234.....55&10%  
Rolled Plate.....70&10%  
Rolled Raised.....70&10%  
Plate Hinges 1/8, 10 & 13 in., \$ m. 5¢  
"Providence" over 12 in. \$ m. 4¢

**Hoes—****Eye—**

D. & H. Scovill.....20%  
Lane's Crescent, Planters' Pattern.....45&5%  
Lane's Razor Blade, Scovill Pattern.....30%  
Maynard, S. & O. Pat.....45&5%  
Sandusky Tool Co., S. & O. Pat.....70&70%  
Am. Axe and Tool Co., S. & O. Pat.....5%  
Chattanooga Tool Co., S. & O. Pat.....60&10%  
Grub.....60&10%

**Handled—**

Garden, Mortar, &c.....70&70&5&2%  
Planter's, Cotton, &c.....70&70&5&2%  
Warren Hoe.....60&60&5%  
Magic.....\$ doz \$4.00

**Hog Rings and Ringers—**

See Rings and Ringers.

**Hoisting Apparatus—**

See Machines, Hoisting.

**Hollow-Ware—**

See Ware, Hollow.

**Holders—****Bag—**

Sprengle's Pat.....\$ doz \$18.....60%

**Bit—**

Extension.....  
Barber's, \$ doz \$15.00.....40&40&10%  
Ives, \$ doz \$20.00.....60&5&60&10%  
Diagonal.....\$ doz \$24.00, 40&5%  
Angular.....\$ doz \$24.00, 40&5%

**File and Tool—**

Balz Pat.....\$ doz \$4.00, 25%  
Nicholson's File Holders.....20%

**Hooks—****Cast Iron—**

Bird Cage, Sargent's List.....60&10&10%  
Bird Cage, Reading.....75&75&5%  
Clothes Line, Sargent's list.....10&10&25%

Clothes Line, Reading list.....60&10&60&10&10%  
Celling, Sargent's list.....55&10&55&10&10%  
Harness, Reading list.....55&10&55&10&10%  
Coat and Hat, Sargent's list.....55&10&60&10%  
Coat and Hat, Reading.....50&10&60&10&10%

**Wrought Iron—**

Cotton.....\$ doz \$1.25  
Cotton Pat. (N. Y. Mallet and Handle) Wks.....30%  
Tassel and Picture, T. & S. Mfg. Co.....50%  
Wrought Staples, Hooks, &c.....  
See Wrought Goods

**Wire—**

Wire Coat and Hat, Gem, list April, 1889.....60&60&10%  
Wire Coat and Hat, Miles, list April, 1889.....50&50&10%  
Indestructible Coat and Hat.....45&45&5%  
Wire Coat and Hat, Standard.....60&60&10%  
Handy Hat and Coat.....50&10&60%  
Ready Ceiling Hooks.....50&10&60%  
Belt.....80&15&80&2%  
Atlas Coat and Hat.....65%  
Williamson's Bird Cage Hooks, list April, 1892.....40%  
Bright Wire Goods—See Wire.

**Miscellaneous—**

Grass, No. 2, \$2.00; No. 3, \$2.10; No. 4, \$2.25  
Nolin's Grass.....\$ doz \$2.25  
Belk.....55&60%  
Whiffletree—Patent.....65%  
Hooks and Eyes—Malleable Iron.....70&70&10%  
Hooks and Eyes—Brass.....80&10&10%  
Fish Hooks, American.....50%  
Bench Hooks—See Bench Stops.

**Horse Nails—See Nails, Horse****Horse Shoes—**

See Shoes, Horse.

**Hose, Rubber—**

Competition.....75&75&10&5%  
Standard.....60&10&10&70&10%  
Extra.....60&60&10%  
N. Y. B. & P. Co., Para.....25&5%  
N. Y. B. & P. Co., Extra.....40&40&5%  
N. Y. B. & P. Co., Dundee.....50&10&60%

**Huskers—**

Blair's Adjustable.....\$ gr \$8.00  
Blair's Adjustable Clipper.....\$ gr 7.00  
Hubbard's Solid Steel.....\$ gr 4.50

**Indurated Fiber Ware—**

See Ware, Indurated Fiber.

**Irons.****Sad—**

From 4 to 10, at factory.....\$ 100 m.  
Self-Heating.....\$ doz \$2.40  
Self-Heating Tailors'.....\$ doz \$8.00  
Enterprise Irons, list Jan. 17, 1893.....30%  
Enterprise Star Irons, list Jan. 17, 93.....30%  
Crown.....60&10&60&10&5%  
Ideal Irons, new list.....50&10&50&10&10%  
Salamander Irons.....25%  
B. B. Sad Irons, \$ m. 3¢  
Chinese Laundry (N. E. Butt Co.).....8¢, 15¢  
W. England.....5¢, 20&20&5%  
Mahony's Troy Pol. Irons.....50&10&5%  
Sensible, list Jan. 91.....50&10&5%  
Sensible Tailor's Irons.....33&4%  
National Self-Heating.....30%

**Soldering—**

Soldering Coppers.....\$ m 19&21¢  
Covert's Adjustable, list Jan. 1, 1886.....35&2%  
Tinker's Dread.. \$ doz \$1.75; \$ gr. \$18

**Pinking—**

Pinking Irons, \$ doz., 55&60¢.

**Jack Screws—See Screws.****Jacks, Wagon—**

Daisy.....33&4%  
Victor.....33&4%  
Lockport.....40%

**Kettles—**

Brass, Spun, Plain, list Jan. 1, '91, 25&5%  
Brass Spun, Plid. W. M. list Jan. 1, '91, 20%  
Stamped Brass Kettles.....\$ m 21¢  
Enameled and Tea—See Ware, Hollow.  
**Keys—**  
Lock, Ass'n list Dec. 30, 1886.....65&10&70%  
Eagle, Cabinet, &c.....33&3%  
Hotchkiss' Brass Blanks.....40%  
Hotchkiss' Copper and Tinned.....40%  
Hotchkiss' Pad. and Cab.....35%  
Wollensak Tinned.....50&10%

**Knife Sharpeners—**

See Sharpeners, Knife.

**Knives—****Butcher, Shoe, &c.**

Wilson's Butcher Knives, list Dec 8, 1890.....25%  
Ames' Butcher Knives.....25%  
Posters' Butcher.....40%  
Jordan's A. A. Butchers', list.....net  
Nichols' Butcher Knives.....40&10%  
W. W. Wilson, Butcher, 6 in., \$2.00; 7 in., \$2.70; 8 in., \$3.80, &c.....20&25%  
Ames' Shoe Knives.....\$ doz \$1.50, 15&20%  
Nichols' Shoe and Bread.....20&20&10%  
Hay and Straw—See Hay Knives.  
Table and Pocket—See Cutlery.

**Corn—**

Bradley's.....10%  
Wadsworth's.....25&25&10%

**Drawing—**

Witherby.....  
P. S. & W.....75&75&10&5%  
Mlx.....  
New Haven.....60&10&60&10&5%  
Merrill.....75&75&5%  
Watrous.....10&10&25%

L. & J. J. White.....20&25%  
Bradley's.....25%  
Adjustable Handle.....25&33%  
Wilkinson's Folding.....25&25&5%

**Hay and Straw—**

Lightning, from jobbers.....\$8.00&\$9.09  
Wadsworth's.....40&75&40&10%  
Carter's Needle.....\$ doz. \$11.00&\$11.50  
Heath's.....\$ doz. \$13.00&\$13.50  
Nolin's Hay.....\$ doz. \$7.00&\$8.00

**Mincing—**

Am. (2d quality), \$ gr., 1 blade, \$7  
2 blades, \$12; 3 blades, \$18.....net  
Lothrop's.....20&10%  
Yale & Towne Wood, list Dec., 1885.....45&50%  
Knapp & Cowles.....50&10&60%  
Buffalo Adjustable.....\$ doz. \$3.00, 33&4%

**Knobs—**

Door, Mineral.....60&65%  
Door, Por. Jap'd.....70&75%  
Door, Por. Nickel.....\$2.00&\$2.25  
Door, Por. Plated Nickel.....\$2.00&\$2.25  
Drawer, Porcelain.....60&10&60&10&10%  
Hemlock Door Knobs.....40&10&60%  
Yale & Towne Wood, list Dec., 1885.....40%  
Base, Rubber Tip.....70&10&5%  
Picture, Judd's.....60&10&10&70%  
Picture, Sargent's.....70&10%  
Picture, Hemlock.....85&5%  
Shutter, Porcelain.....65&15%  
Carriage, Jap.....\$ gro 80¢, 60&10%  
Bardsley's Wood Door, Shutter, &c.....15%

**Ladders.**

Davies Extension and Single.....20&5%

**Ladies—**

Melting, Sargent's.....60&60&5%  
Melting, Reading.....35&10%  
Melting, P. S. & W.....35&10&40%  
Melting, Warner's.....50%

**Lanterns—****Tubular—**

Regular, with Guard.....\$ doz \$3.50  
O. K., with Guard.....\$ doz \$3.75  
Side Lift, with Guard.....\$ doz \$4.00  
Square Lift, with Guard.....\$ doz \$4.25  
Anti-Friction, with Guard.....\$ doz \$4.50  
Brass Plated, Sq. Lift, Guard.....\$ doz \$5.50  
Cop. Plated, Sq. Lift, Guard.....\$ doz \$5.50

**Bull's Eye Police—**

2 1/4-inch regular.....\$ doz \$3.60  
3-inch regular.....\$ doz \$3.90  
2 1/4-inch flash light.....\$ doz \$4.00  
3-inch flash light.....\$ doz \$4.50

**Lawn Mowers—**

See Mowers, Lawn.

**Leaders, Cattle—**

Humason, Beckley & Co.'s.....70%  
Sargent's.....70&10&70&10&10%  
Hotchkiss.....30%  
Peck, Stow & W. Co.....60&10%

**Lemon Squeezers—**

See Squeezers, Lemon.

**Lifters, Transom—**

Wollensak's:  
Class 3 and 4, Bronzed Iron.....50%  
Class 3 and 4, Bronze Metal.....25%  
Class 3 and 4, Brass.....35%  
Skylight Lifters.....35%  
Crown, Eagle and Shield.....50%  
Reiter's, list Feb. 20, 1891.....50&10&10&2%  
Bronzed Iron Rods.....50&10&10&2%  
Brass, Real Bronze or Nickel Plate.....30%  
Excelsior.....50&10&10&2%  
Shaw's.....60&10%  
Payson's:  
Universal.....60%  
Solid Grip.....60&10&60&10&10%  
Imperial.....60&10%

**Lines—**

Cotton and Linen Fish.....50%  
Chalk.....60%  
Masons' Linen, 84 ft., No. 1, \$1.25; No. 2, \$1.75; No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25.....25%  
Cotton Chalk.....55%  
Samson Cotton, No. 1, \$2; No. 2, \$2.50; No. 3, \$3.....10%  
Silver Lake, Braided No. 0, \$6.00; No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50; No. 4, \$8.....25%  
Mason's Linen, No. 3 1/2, \$1.50; No. 4, \$2.00; No. 4 1/2, \$2.50.....45%  
Mason's Colored Cotton.....45%  
Wire Clothes, Nos. 18 19 20  
100 ft.....\$3.60 \$3.00 \$2.50  
Ventilator Cord, Samson Braided, White or Drab Cotton, \$ doz \$7.50, 20%  
Ossawan Mills, Chalk, Twisted, 60%  
Chalk, Soft Braided, 50% Chalk, Braided, 25%.

**Links, Open—**

Terry's—per gro:  
Nos.....1 2 3 4  
\$6.00 8.00 12.00 16.00

**Locks, &c.—****Cabinet—**

Eagle, Gaylord Par. } List March, '84, rev.  
ker and Corbin. } Jan. 1, '85, 33&4%  
Deltz, Nos. 36 to 39.....40%  
Deltz, Nos. 51 to 63.....40&10%  
Deltz, Nos. 87 to 98.....30%  
Champion Night Latches.....40&40%  
Eames Mfg. Co.....40&40%  
Eagle and Corbin Trunk.....25&10%  
Champion Cab. and Combin.....33&4%  
Yale.....net prices  
Romer's.....25%

**Door, Locks, Latches, &c.—**

R. & E. Mfg. Co., list Mar. 20, 1889.....65&10&70%  
Mallory, Wheeler & Co., list July, '88.....lower net prices  
Sargent & Co., list Aug. 1, '88.....often made  
Brantford Lock Works.....made

**Brittan, Graham & Mathes, list Jan. 1890.**  
 Plate, 30x42x10 60x10x10  
 Barnes Mfg. Co. 40x40x10  
 Yale, 30x42x10 net prices  
 Deitz Flat Key 15x  
 Bomer's Night Latches 15x  
 Brooklyn Latches 60x10x  
 Warner's Burglar Proof, 3 doz, \$3.00, 50x

### Padlocks—

List June 10, 1891. 50x2x  
 Norwich Lock Mfg. Co., old list. 50x2x  
 Yale Lock Mfg. Co.'s, 50x2x net prices  
 Eagle 40x  
 Eureka, Eagle Lock Co. 40x2x  
 Bomer's Nos. 0 to 91 30x  
 Bomer's Scandinavian, &c., Nos. 100 to 505 15x  
 A. E. Deitz 15x  
 Champion Padlocks 40x  
 Hotchkiss 30x  
 Star 60x  
 Horseshoe, 3 doz \$9, 50x2x10  
 Barnes Mfg. Co. 40x40x10  
 No. 1 30x  
 Scandinavian 90x2x  
 E. T. Fraim's Keystone Scandinavian, Nos. 119, 120, 130 and 140 90x10x  
 Other Nos. 65x  
 Ames Sword Co. up to No. 150 40x  
 Ames Sword Co. above No. 150 50x  
 Blaymaker, Barry & Co. 90x2x  
 No. 1010 line 90x2x  
 No. 41 line 50x2x  
 No. 61 line 80x2x  
 No. 21 line 75x10x

### Sash, &c.—

Clark's No. 1, 10; No. 2, 38 gr 33x4  
 Ferguson's 33x4  
 Victor 60x10x2x  
 Walker's 10x  
 Attwell Mfg. Co. 25x33x4  
 Reading 60x10x2x  
 Hammond's Window Springs 40x  
 Common Sense, Jap'd, Cop'd and Br'd 40x  
 Common Sense, Nickel Plated 40x  
 Universal 30x  
 Kempshall's Gravity 60x  
 Kempshall's Model 60x60x10x  
 Corbin's Daisy, list Feb. 15, 1888 70x  
 Payson's Perfect 60x10x2x  
 Huginlin's Sash Balances 25x25x10x  
 Huginlin's New Sash Locks 25x25x10x  
 Ives Patent 60x10x2x  
 Fish (Liescher's pat.) No. 100, gr 38x  
 No. 105, gr 41x  
 Davis, Bronze, Barnes Mfg. Co. 60x  
 Champion Safety list January, 1893 70x5x  
 Security 70x  
 Giant, list Jan., 1892 70x5x  
 Wolcott's 80x10x2x  
 Monarch 50x

### Lumber Tools—

See Tools, Lumber.

### Lustro—

Four-ounce bottles, 3 doz, \$1.75; 3 gross, \$17.00

### Machines.

#### Boring—

Without Augers. Upright. Angular.  
 Douglas \$5.00 \$6.75 50x  
 Snell's Rice's Pat. 5.50 6.75 40x10x10  
 Jennings 5.50 6.75 45x10x  
 Other Machines 2.35 2.75  
 Phillips' Patent with Augur 7.00 7.50  
 Miller's Falls 7.50 25x

#### Fluting—

Knox, 4 1/2-inch Rolls, \$3.25 each 35x  
 Knox, 6-inch Rolls, \$3.60 each 35x  
 Eagle, 3 1/2-inch Rolls, \$2.15 35x  
 Eagle, 4 1/2-inch Rolls, \$2.85 35x  
 Crown, 4 1/2 in., \$3.50; 6 in., \$4.00; 8 in., \$5.60 each 35x  
 Crown Jewel, 6 in., \$3.50 each, 35x  
 American, 6 in., \$3.00; 6 in., \$3.40; 7 in., \$4.50 each 35x  
 Domestic Fluter, 10x, each, \$1.50  
 Geneva Hand Fluter, White Metal, 25x  
 Crown Hand Fluter, No. 1, \$12.25; No. 2, \$15.00; 3, \$10.00; 4, \$8.25 30x  
 Shepard Hand Fluter, No. 85, per doz \$15.50 40x  
 Shepard Hand Fluter, No. 110, 40x  
 Shepard Hand Fluter, No. 95, 40x  
 Shepard Hand Fluter, No. 95, 40x  
 Combined Fluter and Sad Iron, 40x  
 3 doz \$15.00, 30x

#### Hoisting—

Moore's Hand Hoist, with Lock Brake 20x  
 Moore's Differential Pulley Block 40x  
 Energy's Mfg. Co.'s 25x  
 Sure Grip Steel Tackle Blocks 25x

#### Washing—

Anthony Wayne, 3 doz, No. 1, \$51; No. 2, \$45; No. 3, \$42.  
 Western Star, 3 doz, No. 2, \$45; No. 2, \$45.  
 Weissell, 3 doz \$54.00  
 Fair and Square, 3 doz \$42.00

### Mallets—

Hickory 20x10x20x10x10x  
 Legumvite 20x10x20x10x10x  
 B. & L. Block Co., Hickory & L. V. 30x30x10x

### Mattocks—Regular list.

60x10x10x10x10x

### Measures—

Standard Fiberware, No. 1, peck 3 dozen, \$3.50; 1/4 peck, \$3.00.

### Meat Cutters—

See Cutters Meat.

### Menders, Harness—

Per doz \$2.00

### Milk Cans—See Cans, Milk.

### Mills— Coffee—

Box and Side, list Jan. 1, 1888 60x60x10x  
 Net prices are often made which are lower than above discount  
 American, Enterprise Mfg. Co., list Jan. 17, 1893 20x  
 The Swift, Lane Bros. 30x

### Mincing Knives—

See Knives, Mincing.

### Molasses Gates—

See Gates, Molasses.

### Money Drawers—

See Drawers, Money.

### Mowers, Lawn—

Best Machines: 10-in., \$4; 12-in., \$4.50; 14-in., \$5; 16 in., \$5.50; 18-in., \$6  
 Low-Grade Machines: 10-in., \$3; 12-in., \$3.25; 14-in., \$3.50 each

### Muzzles—

Safety 3 doz, \$3.00, 25x

### Nails.—

Cut and Wire. See Trade Report.  
 Wire Nails, Papered.  
 Association list, May 1, 92, 80x10x10x5x  
 Tack Mfrs.' list 70x5x70x10x5x  
 Hungarian, Finishing, &c. See Tacks.

### Horse—

Nos. 6 7 8 9 10  
 American 38x 34x 34x 34x 34x net  
 Ausable 28x 26x 25x 24x 23x

Clinton, Fin. 19x 17x 16x 15x 14x 30x10x2x  
 Essex 28x 26x 25x 24x 23x 40x10x5x50x5x

Lyra 19x 17x 16x 15x 14x 40x10x5x  
 Snowden 19x 17x 16x 15x 14x 40x10x5x  
 Vulcan 23x 21x 20x 19x 18x 25x  
 Northwest'n 25x 23x 22x 21x 20x 25x25x5x

A. C. 25x 23x 22x 21x 21x 25x10x33x4x5x  
 C. B. K. 25x 23x 22x 21x 21x 33x4x33x4x10x

Maud S. 25x 23x 22x 21x 21x 40x10x5x  
 Champlain 28x 26x 25x 24x 23x 40x5x50x5x

Saranac 23x 21x 20x 19x 18x 40x5x  
 Champion 25x 23x 22x 21x 20x 10x10x10x

Capewell 19x 18x 17x 16x 16x 10x5x  
 Anchor 23x 21x 20x 19x 18x 25x  
 Western 23x 21x 20x 19x 18x 50x  
 Empire Bronzed 13x13x14x 50x

### Picture—

Brass Head, Sargent's list 60x60x10x  
 Brass Head, Combination list 50x10x10x  
 Porcelain Head, Sargent's list 50x10x10x  
 Porcelain Head, Combination list 40x10x10x  
 Niles' Patent 40x

Nail Pullers—See Pullers, Nail.

Nail Sets—See Sets, Nail.

### Nut Crackers—

See Crackers, Nut.

### Nuts—List Dec. 18, 1889.

Hot Pressed Square Hex.  
 Cold Pressed 5.30 6.50 off list  
 In packages of 100 lb, add 1.30x 1/2 lb, net; in packages less than 100 lb, add 1/2x 1/2 lb, net.

Oakum—  
 Best or Government 60x60x7 1/2x  
 U. S. Navy 50x60x6x  
 Navy 50x60x5x

Oil Tanks—See Tanks, Oil.

Oilers—  
 Zinc and Tin 65x10x70x5x  
 Brass and Copper 50x10x60x10x5x  
 Malleable, Hammers' Improved, No. 1, \$3.60; No. 2, \$4.00; No. 3, \$4.40 10x10x5x  
 Malleable, Hammers' Old Pattern, same list 10x10x5x  
 Prior's Pat. or "Paragon" Zinc 60x10x10x  
 Prior's Pat. or "Paragon" Brass 50x  
 Olmstead's Brass and Zinc 50x  
 Olmstead's Brass and Copper 50x  
 Olmstead's Zinc 60x  
 Broughton's Brass 50x  
 Broughton's Zinc 50x  
 Gem, P. D. & Co. 50x  
 Steel, Draper & Williams 50x

Openers, Can—  
 Messenger's Comet 3 doz \$3.00, 25x  
 American 3 doz \$2.75, 25x  
 Duplex 3 doz 25x, 15x20x  
 Lyman's 3 doz \$3.75, 20x  
 No. 4, French 3 doz \$2.25, 55x60x  
 No. 5, Iron Handle 3 gr \$6.00, 45x50x  
 Eureka 3 doz \$2.50, 10x  
 Sardine Scissors 3 doz \$2.75, 30x  
 Sprague, No. 1, \$2.00; 2, \$2.25; 3, \$2.50 60x70x  
 Excelsior, No. 1 \$2.50; No. 2, \$1.50 40x  
 World's Best 3 gross, No. 1, \$12.00; No. 2, \$24.00; No. 3, \$36.00 50x2x  
 Universal 3 doz \$2.00 45x  
 Domestic 3 doz \$2.00 45x  
 Champion 3 doz \$2.00 50x

Packing, Steam—  
 Rubber—  
 Standard 70x70x10x  
 Extra 60x60x5x  
 N. Y. B. & P. Co., Standard 50x  
 N. Y. B. & P. Co., Empire 60x  
 N. Y. B. & P. Co., Salamander 25x  
 Jenkins' Standard 80x 25x25x5x

Miscellaneous—  
 American Packing 10x11x 7x8x  
 Austria Packing 13x14x 14x  
 Italian Packing 13x14x 14x  
 Cotton Packing 15x17x 17x  
 Jute 7x8x

### Pails—

S. S. & Co.: 18-qt., \$7.00; 20-qt., \$7.25 per doz

### Creamery—

Galvanized—

Quarts 10 12 14  
 Hill's Light Weight, 3 doz \$2.75 3.00 3.25  
 Hill's Heavy Weight, 3 doz 3.00 3.25 3.75  
 Helwig's 2.50 2.75 3.00  
 Sidney Shepard & Co. 2.35 2.85 3.05  
 Iron Clad 2.50 2.75 3.00  
 Fire Buckets 2.75 3.25 3.50  
 Buckets—See Well Buckets.

Indurated Fiber Ware—25x  
 Star Pails, 12 qt. 3 doz \$4.20  
 Milk 14 qt. 3 doz \$5.40  
 Stable 14 qt. 3 doz \$6.00  
 Fire Pails, deep 3 doz \$4.80  
 Fire Pails, round bottom 3 doz \$5.40

Standard Fiber Ware—  
 Plain. Dec'd  
 Water Pails, 12 qt., 3 doz \$3.80 \$4.00  
 Dairy Pails, 14 qt., 3 doz 4.00 4.50  
 Fire Pails, 12 1/2 qt., 3 doz 4.00 4.50  
 Fire Pails, No. 2, 14 qt., 3 doz 4.50 5.00  
 Sugar Pails 5.50 6.00  
 Horse Pails 4.50 5.00  
 Buggy Pails 3.50 4.00  
 Slop Jars (bal. trap) 7.50 8.50  
 Chamber Pails, 14 qt. 6.00 7.00

Pans—  
 Dripping—  
 Small sizes 3 doz \$5 1/2x  
 Large sizes 3 doz \$6 1/2x  
 Silver & Co. (Covered) 40x

Fry—  
 Standard List:  
 No. 1 0 1 2 3 4  
 3 doz \$3.00 \$3.75 \$4.25 4.75 \$5.25  
 No. 2 5 6 7 8 9  
 3 doz \$6.00 \$7.00 \$8.00 \$9.00 \$10.00  
 Polished, regular goods 75x75x10x  
 Acme Fry Pans 60x

Dust—  
 Steel Edge, No. 1 3 doz \$1.75

Roasting and Baking—  
 Columbia, S. S. & Co.: Nos. 10, \$2; 20, \$2.25; 30, \$2.50 each 50x

Paper and Cloth—  
 Sand and Emery—  
 List April 19, 1886 50x10x50x10x5x  
 Sibley's Emery and Crocus Cloth 30x

Parers—  
 Apple—  
 Advance 3 doz \$4.75  
 Baldwin 3 doz 5.25  
 Bonanza 3 doz 5.00  
 Daisy 3 doz 4.00  
 Dandy 3 doz 7.50  
 Eclipse 3 doz 4.25  
 Europa 1888 3 doz 16.00  
 Family Bay State 3 doz 12.00  
 Favorite 3 doz 5.00  
 Gold Medal 3 doz 4.00  
 Ideal 3 doz 4.00  
 Improved Bay State 3 doz 27.00x80.00  
 Little Star 3 doz 4.50  
 Monarch 3 doz 13.50  
 New Lightning 3 doz 5.50  
 Oriole 3 doz 4.00  
 Penn 3 doz 4.00  
 Perfection 3 doz 4.00  
 Pomona 3 doz 4.00  
 Raging Bable 3 doz 4.00  
 Turn Table 3 doz 4.50  
 Victor 3 doz 13.50  
 Waverly 3 doz 4.00  
 White Mountain 3 doz 4.00  
 72 3 doz 4.25  
 78 3 doz 7.00

Potato—  
 White Mountain 3 doz \$4.50  
 Antrim Combination 3 doz \$5.50  
 Hoosier 3 doz \$1.50  
 Saratoga 3 doz \$5.50

Pencils—  
 Faber's Carpenters' high list 50x  
 Faber's Round Gilt 3 doz \$5.25  
 Dixon's Lead 3 doz \$4.50  
 Dixon's Lumber 3 doz \$6.75  
 Dixon's Carpenters' 10x

Picks—  
 Railroad or Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13.00 60x10x60x10x10x  
 Picture Nails—  
 See Nails, Picture.

Pinking Irons—  
 See Irons, Pinking.

Pins—  
 Bow—  
 Humason, Beckley & Co.'s 60x10x  
 Sargent & Co.'s \$17 and \$18 60x10x  
 Peck, Stow & W. Co. 50x10x50x10x5x  
 Silvered Glass 3 doz net  
 White Enamel 3 doz net

Escutcheon—  
 Iron, list Nov. 11, 1885 50x10x50x10x5x  
 Brass 60x60x5x

Pipe, Wrought Iron—  
 List October 12, 1892.  
 1 1/2 and under, Plain 60x10x  
 1 1/2 and under, Galv 52x10x  
 1 1/2 and over, Plain 70x10x  
 1 1/2 and over, Galv 60x10x  
 Hotter Tubes, list Oct. 1892 52x10x  
 Casing, list Nov. 16, 1892 52x10x  
 Inserted Joints Casing, list Nov. 16, 1892 47x5x  
 Steel Boiler Tubes 27x5x  
 Cold Drawn Seamless Steel Tubing 50x

Planes and Plane Irons—  
 Wood Planes—  
 Molding 40x40x10x  
 Bench, First quality 45x45x10x  
 Bench, Second quality 50x50x10x  
 Bailey's (Stanley R. & L. Co.) 50x10x

Iron Planes—  
 Bailey's (Stanley R. & L. Co.) 50x10x  
 Miscellaneous Planes (Stanley R. & L. Co.) 25x10x  
 Steers' Iron Planes 50x50x5x  
 Meriden Mal. Iron Co.'s 50x50x5x  
 Davis' Iron Planes 50x50x5x  
 Birmingham Planes Co. 60x60x5x  
 Gage Tool Co.'s Self-Setting 20x10x10x  
 Chaplin's Iron Planes 50x50x5x  
 Sargent's 60x60x10x  
 Standard Tool Co. 60x50x5x

### Plane Irons—

Butcher's \$5.00x\$5.25 to \$5.30x  
 Buck Bros. 30x  
 Auburn Thistle 30x10x  
 Ohio 30x10x  
 Sandusky 25x  
 L. & F. White 50x10x  
 Stanley R. & L. Co. 50x10x

### Plates—

Felice 60x60x5x

### Pliers and Nippers—

Button's Patent 60x  
 Hall's No. 2, 6 in. \$13.50; No. 4, 7 in. \$21.00 3 doz  
 Humason & Beckley Mfg. Co. 50x60x10x  
 Lindsay's Giant 38x4x  
 Gas Pliers 60x  
 Gas Pliers, Custard's Nickel Plated 60x5x  
 Eureka Pliers and Nippers 40x  
 Russell's Parallel 25x  
 P. S. & W. Cast Steel 50x  
 P. S. & W. Tinnars' Cutting Nippers 10x  
 Add 6x  
 Carew's Pat. Wire Cutters 30x  
 Morrill's Parallel 3 doz \$12.00 30x5x  
 Cronk's 8 in., \$15.00; 10 in., \$21.00 50x50x5x  
 Cronk's Button Pattern 60x10x60x  
 Cronk's Carrier Pliers 60x60x5x

### Plumbs and Levels—

Regular List 75x10x75x10x5x  
 Stanley's Duplex 20x10x  
 Stanley's Handy 20x10x  
 Diston's 50x  
 Pocket Levels 70x10x70x10x10x  
 Davis Iron Levels 40x10x

### Poachers, Egg—

Buffalo Steam Egg Poachers 3 doz, No. 1, \$8.00; No. 2, \$9.00 33x4x  
 Silver & Co., 6-Ring, 3 doz, \$4.00; 3-Ring 2.00

### Pokes, Animal—

Bishop's I. X. L. 3 doz \$6.00  
 Bishop's O. K. 3 doz \$5.25  
 Bishop's Pioneer 3 doz \$3.75  
 Bishop's American 3 doz \$2.75  
 Eagle, Double Stale 3 doz \$5.75  
 Eagle, Single Stale 3 doz \$3.75  
 Buckeye, Single Stale 3 doz \$2.75  
 Bolding 3 doz \$6.00  
 Metallic Horse Poke 3 doz, \$6.00

### Police Goods—

R. I. Tool Co., Handcuffs, \$15.00 3 doz 10x  
 R. I. Tool Co., Leg Irons, \$25.00 3 doz 10x  
 Tower's 25x  
 Dwyer's Improved Handcuffs, 2 Hands, Polished, 3 doz, \$45.00, Nickle-plated, \$57.00; 3 hands, Polished, 3 doz, \$72.00; Nickle-plated, \$84.00 25x  
 J. P. Lovell's Police Goods 25x

### Polish— Metal—

Prestoline 30x  
 Prestoline Paste 33x4x  
 Gaston's Silver Compound 33x4x

### Stove—

Joseph Dixon's 3 gro, \$9.00, 10x  
 Japanese 3 gro, \$4.50, 10x  
 Gold Medal 3 gro, \$8.00, 25x  
 Lustrous 3 gro, \$4.75  
 Ruby 3 gro, \$3.75  
 Rising Sun, 6 gro lots 3 gro \$5.50  
 Dixon's Plumbago 3 gro \$8.00  
 Boynton's Noon Day 3 gro \$13.00  
 Parlor Fridge Stove Enamel, 3 gro  
 Yates' Liquid 2 3 5 10 gal  
 gal. \$0.80 70 60 50  
 Yates Standard Paste Polish, 10 lb cans, 12x  
 Jet Black 3 gro \$3.50  
 Japanese 3 gro \$3.50  
 Fireside 3 gro \$2.50  
 Diamond O. K. Enamel 3 gro \$19.00  
 Bonnell's Liquid Stove Polish, 3 gro \$9.00  
 Bonnell's Paste Stove Polish, 3 gro \$8.00  
 Black Eagle Benzine Paste, 5 and 10 lb cans 12x  
 Black Jack Water Paste, 5 and 10 lb cans 12x  
 Nickel Plate Paste 3 gro \$8.00  
 Crown Paste 3 gro \$7.30  
 Crown Paste in 5 and 10 lb pails 3 gro \$7.20  
 Black Flag, 5 and 10 lb pails 3 gro \$12x  
 Black Flag, liquid, in bottles, 3 gro \$8.00  
 Diamond Rock Nickel Cleaner 3 gro \$10.20

### Raven Paste—

5-lb. pails, (per case of 6 or 12), 3 doz \$1.15  
 Less than case 1.15  
 Liquid, 8 oz. bottles 3 doz \$3.00  
 Liquid, 8 oz. bottles 3 doz \$3.00  
 Water Polish 3 doz \$5.85

### Poppers, Corn—

Round or Square, 1 qt. 3 gr \$10.00x10.50  
 Round or Square, 1 1/2 qt. 3 gr \$15x15.50  
 Round or Square, 2 qt. 3 gr \$18.50x19.00

### Post Hole and Tree Augers and Diggers—

See Diggers, Post Hole, &c.

### Potato Parers—

See Parers, Potato.

### Pots—

#### Glue—

Tinned 40x10x40x10x5x  
 Enameled 40x10x40x10x5x  
 Family, Howe's "Eureka" 40x  
 Family, L. F. C.'s "Handy" 50x

### Powder—



**Snaps, Harness, &c.**

Anchor (T. & S. Mfg. Co.)	65¢
Vitch's (Bristol)	50¢10¢
Hutchins	10¢
Andrews	10¢
Bargen's Patent Guarded	70¢10¢10¢
German, new list	40¢10¢
Covert	50¢10¢5¢2¢
Covert, New Patent	50¢10¢5¢2¢
Covert, New R. E.	60¢10¢5¢2¢
Covert Spring	60¢10¢10¢
Covert's Saddle Works' Triumph	83¢
John Protz Snaps	75¢75¢5¢

**Snaths. Scythe—**

See Irons, Soldering.	50¢50¢5¢
-----------------------	----------

**Soldering Irons—**

See Irons, Soldering.	70¢10¢
-----------------------	--------

**Spittoons, Cuspidors, &c.**

Standard Fiberware	50¢10¢5¢
--------------------	----------

**Cuspidors, 8½-inch, No. 5, 8; No. 12, 10.**

Spittoons, Daisy, 8-inch, No. 1, 4; 10 and 11 inch, 10.	50¢10¢5¢
---	----------

**Spoke Shaves—**

See Shaves, Spoke.	50¢10¢5¢
--------------------	----------

**Spoke Trimmers—**

See Trimmers, Spoke.	50¢10¢5¢
----------------------	----------

**Spoons and Forks—**

Tinned Iron	50¢10¢5¢
-------------	----------

**Basting, Cen. Stamp, Co.'s list.**

Solid Table and Tea, Cen. Stamp, Co.'s list	70¢10¢
---	--------

**Buffalo, S. & Co.**

See Buffalo, S. & Co.	33¢3¢2¢
-----------------------	---------

**Silver Plated—**

months or 5% cash 30 days:	40¢15¢
----------------------------	--------

**Meriden Brit. Co., Rogers.**

C. Rogers & Bros.	40¢15¢
-------------------	--------

**Rogers & Bros.**

Reed & Barton	40¢10¢5¢
---------------	----------

**Wm. Rogers Mfg. Co.**

Simpson, Hall, Miller & Co.	40¢15¢5¢
-----------------------------	----------

**Holmes & Edwards Silver Co.**

No. 67 Mexican Silver	50¢10¢5¢
-----------------------	----------

**No. 30 Silver Metal.**

No. 24 German Silver	50¢10¢5¢
----------------------	----------

**No. 50 Nickel Silver.**

No. 49 Nickel Silver	50¢10¢5¢
----------------------	----------

**Wm. Rogers Mfg. Co.**

Rogers' Silver Metal	50¢10¢5¢
----------------------	----------

**18% Rogers' German Silver.**

22% Rogers' Nickel Silver	50¢10¢5¢
---------------------------	----------

**German Silver.**

German Silver, Hall & Elton	50¢10¢5¢ cash
-----------------------------	---------------

**Nickel Silver.**

Britannia	60¢75¢5¢
-----------	----------

**Boardman's Nickel Silver, list July 1, 1891.**

Boardman's Britannia Spoons, case lots	60¢75¢5¢ cash
--	---------------

**Spring—**

Torrey's Rod, 39 in.	50¢120¢12
----------------------	-----------

**Warner's No. 1, 50¢; No. 2, 55¢.**

Gem (Coll), list April 19, 1888.	55¢55¢10¢
----------------------------------	-----------

**Star (Coll), list April 19, 1888.**

Victor (Coll)	20¢10¢
---------------	--------

**Champion (Coll).**

Gowell's, No. 1, 50¢; No. 2, 115¢.	60¢10¢10¢5¢
------------------------------------	-------------

**Rubber, complete, 50¢; No. 10, 50¢.**

Hercules	50¢50¢10¢
----------	-----------

**Carriage, Wagon, &c.**

Multiple, Concord, Platform and Half	50¢10¢50¢10¢10¢ or net prices
--------------------------------------	-------------------------------

**Cliff's Bolster Springs.**

See Cliff's Bolster Springs.	25¢
------------------------------	-----

**Squares—**

Steel and Iron	85¢85¢5¢
----------------	----------

**Nickel-Plated.**

Try Square and T Bevels	60¢10¢10¢
-------------------------	-----------

**Fountain's Try Square and T Bevels.**

Winterbottom's Try and Meters	30¢10¢
-------------------------------	--------

**Starrett's Micrometer Caliper Squares.**

Avery's Flush Bevel Squares	25¢
-----------------------------	-----

**Avery's Bevel Protractor.**

See Avery's Bevel Protractor.	50¢
-------------------------------	-----

**Squeezers—**

Fodder—	50¢
---------	-----

**Blair's.**

Blair's "Climax"	50¢125¢
------------------	---------

**Lemon—**

orcelain Lined, No. 1	50¢30¢
-----------------------	--------

**Wood, No. 2.**

Wood, Common	50¢30¢10¢
--------------	-----------

**Dunlap's Improved**

Sammis, No. 1, 50¢; No. 2, 59¢.	37¢20¢
---------------------------------	--------

**118 ½ doz.**

Jennings' Star	25¢10¢
----------------	--------

**The Boss.**

Dean's, Nos. 1, 50¢; No. 2, 53¢.	35¢2¢
----------------------------------	-------

**Little Giant.**

King	50¢50¢5¢
------	----------

**Hutchins' Strain Flash.**

Silver & Co., Glass	50¢120¢
---------------------	---------

**Manny Lemon Juice Extractor.**

Standard	50¢75¢10¢
----------	-----------

**Improved.**

See Warre, Standard Fiber.	50¢
----------------------------	-----

**Standard Fiber Ware—**

See Warre, Standard Fiber.	50¢
----------------------------	-----

**Staples—**

Harbed Blind, ½ in. and larger	75¢75¢
--------------------------------	--------

**Harbed Blind, ½ in.**

Fence Staples, Galvanized	85¢85¢
---------------------------	--------

**Fence Staples, Plain.**

See Fed. Rep.	50¢
---------------	-----

**Grand Crossing Tack Co.'s list.**

See Grand Crossing Tack Co.'s list.	75¢10¢
-------------------------------------	--------

**Steelyards**

See Steelyards	40¢10¢50¢
----------------	-----------

**Stocks and Dies—**

Blacksmith's	50¢
--------------	-----

**Waterford Goods.**

Butterfield's Goods	35¢
---------------------	-----

**Lightning Screw Plate.**

Beccie's New Screw Plates	25¢30¢
---------------------------	--------

**Reversible Ratchet.**

Gardner	30¢
---------	-----

**Green River.**

See Green River	25¢50¢
-----------------	--------

**Stops, Bench**

Morrill's, 5 doz., Nos. 1, 50¢; 2, 110¢.	40¢20¢
--	--------

**Hutchins'.**

See Hutchins'	50¢10¢10¢
---------------	-----------

**Weston's, No. 1, 110¢; No. 2, 50¢.**

See Weston's	25¢10¢5¢
--------------	----------

**McGill's, 5 doz \$3.**

Cincinnati	25¢10¢
------------	--------

**Terrell's Nos. 1 and 2, 5 doz., \$3; No. 3, \$5.00.**

See Terrell's	30¢
---------------	-----

**Stone—**

Stones, Grind—See Grindstones.	50¢
--------------------------------	-----

**Scythe Stones—**

Pike Mfg. Co., list April, 1892.	33¢4¢
----------------------------------	-------

**Cleveland Scythe Co., list Nov. 1892.**

See Cleveland Scythe Co.	33¢5¢
--------------------------	-------

**Oil Stones, &c.—**

Pike Mfg. Co.	50¢
---------------	-----

**Hindostan No. 1, 5 doz.**

Sand Stone	40¢40¢
------------	--------

**Turkey Oil Stone, 4 to 8 in.**

Turkey Slips	50¢
--------------	-----

**Washita Stone, Extra.**

Washita Stone, No. 1	40¢
----------------------	-----

**Washita Stone, No. 2.**

Washita Slips, Extra	80¢
----------------------	-----

**Washita Slips, No. 1.**

Arkansas Stone, No. 1, 3 to 5 ½ in.	50¢
-------------------------------------	-----

**Arkansas Stone, No. 1 5 ½ to 8 in.**

See Arkansas Stone	50¢15¢
--------------------	--------

**Lake Superior.**

Lake Superior Slips	50¢13¢
---------------------	--------

**Stove Polish—**

See Polish, Stove.	50¢
--------------------	-----

**Stretchers, Carpet—**

Cast Steel, Polished	50¢22¢
----------------------	--------

**Cast Iron, Steel Points.**

Socket	50¢17¢
--------	--------

**Bullard's.**

See Bullard's	25¢25¢10¢
---------------	-----------

**Strops, Razor—**

Genuine Emerson	60¢60¢5¢
-----------------	----------

**Imitation**

Torrey's	20¢
----------	-----

**Badger's Belt and Com.**

Lamont Combination	50¢40¢
--------------------	--------

**Jordan's Pat. Padded, list Nov. 1, 79, 50¢.**

Electric Cutlery Co.	Net
----------------------	-----

**Campbell Cutlery Co.**

See Campbell Cutlery Co.	Net
--------------------------	-----

**Stuffer, Sausage—**

Miles' Challenge, 5 doz \$20.	50¢50¢5¢
-------------------------------	----------

**Perry, 5 doz, No. 1, \$15.00; No. 0, \$21.00.**

Draw Cut No. 4, each \$30.00.	20¢
-------------------------------	-----

**Enterprise Mfg. Co., list Jan 17, '93.**

See Enterprise Mfg. Co.	25¢
-------------------------	-----

**Sweepers, Carpet and Lawn—**

See Sweepers	40¢10¢
--------------	--------

**Carpet—**

Bissell No. 5	50¢117¢
---------------	---------

**Bissell No. 8.**

Bissell, Grand	50¢120¢
----------------	---------

**Standard.**

Domestic	50¢121¢
----------	---------

**Domestic, No. 2.**

Grand Rapids	50¢122¢
--------------	---------

**Crown Jewel, No. 1, \$18.00; No. 2, \$19.00.**

See Crown Jewel	50¢123¢
-----------------	---------

**Magic.**

Improved Parlor Queen	50¢124¢
-----------------------	---------

**Nickel.**

Jannaped	50¢125¢
----------	---------

**Excelsior.**

Garland	50¢126¢
---------	---------

**Parlor Queen.**

Housewife's Delight	50¢127¢
---------------------	---------

**Ladies' Friend.**

Ladies' Friend No. 2	50¢128¢
----------------------	---------

**Advance.**

Our Leader	50¢129¢
------------	---------

**Triumph.**

Goshen	50¢130¢
--------	---------

**Supreme.**

Easy	50¢131¢
------	---------

**Gilt Edge.**

Acme	50¢132¢
------	---------

**Imperial.**

Grand Republic	50¢133¢
----------------	---------

**Banner.**

The Star	50¢134¢
----------	---------

**Reliable.**

The Rapid	50¢135¢
-----------	---------

**Our Own.**

Model	50¢136¢
-------	---------

**Goshen Sweeper Company.**

Rapids, Mich., make the following re-	50¢
---------------------------------------	-----

**5 dozen in 6 months.**

10 dozen in 6 months	50¢137¢
----------------------	---------

**25 dozen in 6 months.**

Except on L.F. when 10 dozen price is \$13.50, and 25 dozen \$13.00.	50¢
--	-----

**Lawn—**

Thompson Mfg. Co.	30¢
-------------------	-----

**Swings—**

Davies Lawn	25¢
-------------	-----

**Tacks, Brads &c.—**

List October 19, 1889. Old established	50¢
--	-----

**straight Weights. Short Weight goods**

are sold at lower prices.	50¢
---------------------------	-----

**Carpet Tacks—**

American, Blued and Cop'd.	60¢4¢</
----------------------------	---------



**Whips**

American Whip Co.	Length.	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalebone Driving...	\$18.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00	
Eureka, Two-thirds Whalebone...			15.00	16.50	18.00	20.00			
Bull Bone, Half-length Whalebone...				11.00	12.00	13.00	15.00		
American Standard...		8.00	8.50	9.50	10.50	12.00	13.50	15.00	16.50
True Grip, Raw Hide Center...		6.00	6.00	6.50	7.00	7.50	9.00		
New Name, Stocked Java, Black and Wine Colors...					6.00				
Americus, 93 Pen Whip...					6.00				
Gents' Light Driving No. 117...					6.00				
Gents' Light Driving No. 108...					5.00				
Hand-made Stocked Java No. 103...				3.75	4.00				
A large variety of cheaper grades...							50¢@83.00		
Team Whips...							\$2.00@7.50		
Toy Whips...							\$2.50@12.00		
Hardware Assortment, 10/American, 75 Whips for \$50.00.									

**Wire and Wire Goods—Iron—**

Market,	Br. & Ann. Nos. 0 to 18.	75¢@10¢75¢@10¢5¢	Extra 10% often given.
Cap'd, Nos. 0 to 18.	75¢@10¢75¢@10¢5¢		
Galv., Nos. 0 to 18.	70¢@10¢70¢@10¢		
Tin'd, Tin'd list, Nos. 0 to 18.	70¢@10¢70¢@10¢		

Stone, Br. and Ann'd, Nos. 16 to 18.	80¢	Extra 10% often given.
Bright and Ann'd, Nos. 19 to 26.	80¢@5¢	
Br. and Ann'd, Nos. 27 to 36.	82¢@5¢	
Tinned.	65¢@10¢	
Tinned Broom Wire, 18 to 21.	7¢@10¢	
Galvanized Fence.	75¢@10¢	
Brass, list Jan. 18, 1884.	40¢@5¢	
Copper, list Jan. 18, 1884.	40¢@5¢	
Annealed Wire on Spools.	60¢	

Malin's An'aled & Tin'd on Spools... 60¢@5¢  
 Malin's Brass and Cop. on Spools... 60¢@5¢  
 Tate's Spooled, Tin'd & Annealed... 60¢@5¢  
 Tate's Spooled Cop. and Brass... 50¢  
 Cast Steel Wire... 50¢  
 Stub's Steel Wire... \$1.00 to 2, 30¢  
 Steel Music Wire, 12 to 30, imported... 50¢@70¢

Wire Clothes Line, see Lines.  
 Wire Picture Cord, see Cord.

**Bright Wire Goods—**

Standard list... 80¢@20¢35¢  
**Wire Cloth and Netting—**  
 Painted Screen Cloth, good quality... 100 sq. ft., \$1.40  
 Galvanized Wire Netting... 75¢@75¢10¢

**Wire, Barb—**

See Trade Report.  
**Wire Rope—See Rope, Wire.**

**Wrenches—**

American Adjustable	40¢
Baxter's Adjustable "S"	40¢@10¢50¢
Baxter's Diagonal	60¢
Coe's Genuine	60¢@3¢
Coe's "Mechanics"	50¢@10¢3¢
Garrod Standard	65¢@10¢70¢
Lamson & Sessions' Engineers'	60¢@10¢
Lamson & Sessions' Standard	70¢@10¢
P. S. & W. Agricultural	75¢@10¢80¢
Garrod Agricultural	
Lamson & Sessions' Agric'l.	
W. & B. Diamond	

Bemis & Call's:	Pat. Combination	40¢
Merrick's Pattern		35¢
Briggs Pattern		35¢
Cylinder or Gas Pipe		40¢@5¢
No. 8 Pipe		50¢
Allen's Pocket (Bright)		50¢, 50¢@10¢
The Favorite Pocket		50¢, 50¢@10¢
Webster's Pat. Combination		50¢
Boardman's		50¢
Always Ready		50¢@5¢
Alligator		50¢@10¢
Donohue's Engineer		50¢@10¢
Eagle		50¢@10¢
Acme, Bright		50¢@10¢
Acme, Nickle		50¢@10¢
Hercules		70¢@70¢5¢
Walker's		55¢@5¢
Diamond Steel		55¢@5¢
Cincinnati Brace Wrenches		55¢@10¢
Taft's Vise Wrench		55¢@10¢5¢

**Wringers, Clothes—**

Am. Wringer Co.'s list, Jan. 2, '93.	2% cash
Colby Wringer Co., list Sept. 1, '91.	2% cash
Lovell Mfg. Co., list Jan. 1, 1892.	2% cash
Peerless Mfg. Co., list Feb. 1, 1892.	2% cash
National Wringer & Mfg. Co., list June 1, 1892.	2% cash

**Wrought Goods—**

Staples, Hooks, &c., list March 17, 1893.	85¢@10¢35¢15¢
---	---------------

**Paints, Oils and Colors.—Wholesale Prices.****Animal and Vegetable Oils—**

Linseed, City, raw, per gal.	50
Linseed, City, boiled	53
Linseed, Western, raw	50
Lard, City, Extra Winter	1.05
Lard, City, Prime	1.02
Lard, City, Extra No. 1	75
Lard, City, No. 1	65
Lard, Western, prime	1.00
Cotton-seed, Crude, prime	48
Cotton-seed, Crude, off grades	45
Cotton-seed, Summer Yellow, prime	58
Cotton-seed, Summer Yellow, off grades	55
Sperm, Crude	95
Sperm, Natural Spring	95
Sperm, Bleached Spring	1.03
Sperm, Natural Winter	1.00
Sperm, Bleached Winter	1.05
Whale, Crude	55
Whale, Natural Winter	56
Whale, Bleached Winter	59
Whale, Extra Bleached	58
Sea Elephant, Bleached Winter	40
Menhaden, Crude, Sound	40
Menhaden, Crude, Southern	42
Menhaden, Light Pressed	43
Menhaden, Bleached Winter	45
Menhaden, Extra Bleached	48
Tallow, City, prime	70
Tallow, Western, prime	65
Cocoanut, Ceylon	63
Cocoanut, Cochinchina	74
Cod, Domestic	38
Cod, Foreign	42
Lead, Eng., B.B. white	40
Red Saponified	74
Bank, Nos. 29 gravity, 25 @ 30 cold test	40
Straits	41
Olive, Italian, bbls.	85
Neatfoot, prime	80
Palm, prime, Lagos	74

**Mineral Oils—**

Black, 29 gravity, 25 @ 30 cold test	7
Black, 29 gravity, 15 cold test	7 1/2
Black, 29 gravity, summer	7 1/2
Cylinder, light, filtered	14

Cylinder, dark, filtered	10
Paraffine, 23 1/2 @ 24 gravity	11
Paraffine, 25 gravity	11
Paraffine, 28 gravity	7 1/2
Paraffine, red	9 1/2

**Paints and Colors—**

Barytes, Foreign, 10 ton	\$22.00
Barytes, Amer. floated	\$20.00
Barytes, Amer. No. 1	16.00
Barytes, Amer. No. 2	13.00
Barytes, Amer. No. 3	11.00
Blue, Celestial	6
Blue, Chinese	40
Blue, Prussian	25
Blue, Ultramarine	25
Brown, Spanish	3 1/2
Brown, Vandyke, Amer.	3
Brown, Vandyke, English	6
Carmine, No. 40, in bulk	2.75
Carmine, No. 40, in boxes	2.85
Carmine, No. 40, in ounce bottles	3.75
Chalk, in bulk	2.25
Chalk, in bbls.	33
China Clay, English	13.00
Cobalt Oxide, prep'd	9.00
Cobalt Oxide, black	1.90
Cobalt Oxide, blue	1.96
Green, Paris, in bulk	10
Green, Paris, 170 @ 175	10 1/2
Kegs	12
Green, Paris, small pack	6
Green, Chrome, ordinary	22
Green, Chrome, pure	25
Lead, Eng., B.B. white	8 1/2
Lead, Amn. White, dry or in oil	7
Kegs, lots less than 500 lb.	6 1/2
Kegs, lots 500 lb. to 5 tons	6 1/2
Kegs, lots 5 tons to 12 tons	6 1/2
Kegs, lots 12 tons and over	6 1/2
Lead, White, in oil, 25 lb tin	1
Lead, White, in oil, 12 1/2 lb tin	1
Lead, White, in oil, 1 to 5 lb as sorted tins, add to keg price	2 1/2
Lead, Red, bbls. and 1/2 bbls.	6
Lead, Red, kegs	6 1/2
Litharge, kegs	6 1/2
Litharge, bbls. and 1/2 bbls.	6

TERMS, &c.—Lead and Litharge.—On lots of 500 lb or over, 60 days' time or 2 1/2 % discount for cash if paid within 15 days of date of invoice.  
 Ocher, Rochelle... 1.35  
 Ocher, French Washed... 1 1/2  
 Ocher, German Washed... 1 1/2  
 Ocher, American... 1 1/2  
 Orange Mineral, English... 8 1/2  
 Orange Mineral, French... 10  
 Orange Mineral, German... 8 1/2  
 Orange Mineral, American... 8 1/2  
 Paris White, English Cliff stone... 1.00  
 Paris White, American... 65  
 Red, Indian, English... 5 1/2  
 Red, Indian, French... 5 1/2  
 Red, Turkey... 9  
 Red, Tuscan... 9  
 Red, Venetian, American... 100 lb. 1.00

Red, Venetian, English	1.20
Sienna, Italian, Burnt and Powd.	4
Sienna, Ital. Burnt Lumps	1 1/2
Sienna, Ital. Raw, Powd.	4 1/2
Sienna, Ital. Raw, Lumps	1 1/2
Sienna, American, Raw	1 1/2
Sienna, American, Burnt and Powdered	1 1/2
Talc, American	1 1/2
Terra Alba, French	95
Terra Alba, English	70
Terra Alba, American No. 1	65
Terra Alba, American No. 2	45
Umber, Turkey, Burnt and Powdered	3 1/2
Umber, Turkey, Raw and Powdered	3 1/2
Umber, Turkey, R'w Lumps	2 1/2
Umber, Turkey, Bnt. Amer.	1 1/2
Umber, Turkey, R'w Amer.	1 1/2
Yellow, Chrome	10
Vermillion, American Lead	11 1/2
Vermillion, Quicks'g, bulk	57
Vermillion, Quicks'g, bags	58
Vermillion, Quicksilver sm'r	62
Vermillion, English Import	85
Vermillion, Italian Eng.	8
Vermillion, Trieste	90
Vermillion, Chinese	92 1/2
Whiting Common	37 1/2
Whiting Gliders	45

Zinc, American, dry	4 1/2
Zinc, French, Red Seal	7 1/2
Zinc, French, Green Seal	9
Zinc, French, V. M. X.	9
Zinc, Antwerp, Red Seal	7 1/2
Zinc, Antwerp, Green Seal	7 1/2
Zinc, German, L. Z. O.	6 1/2
Zinc, V. M. in Poppy Oil	10 1/2
Seal, lots of 1 ton and over	10 1/2
lots less than one ton	11 1/2
Zinc, V. M. in Poppy Oil	11 1/2
Red Seal	10
lots of 1 ton and over	10
lots of less than 1 ton	10 1/2
Discovers.—French Zinc.—Discount to buyers of 10 bbl. lots of one or assorted grades, 1 1/2; 25 bbls. 2 1/2; 50 bbls. 4 1/2. No discount allowed on less than bbl. lots.	

Black, Drop, Frankfort	25
Black, Drop, English	12
Black, Drop, Domestic	10
Black, Lampblack, Best	20
Black, Lampblack, Common	7
Black, Ivory	8
Blue, Chinese	35
Blue, Prussian	20
Blue, Ultramarine	12
Brown, Vandyke	7
Green, Chrome	8
Green, Paris	16
Sienna, Raw	7
Sienna, Burnt	7
Umber, Raw	7
Umber, Burnt	7

Putty—	In barrels and 1/2 bbls.	0.13¢
In tubs	0.13¢	0.13¢
In tin cans	0.13¢	0.13¢
In bladders	0.13¢	0.13¢

Spirits Turpentine—	In regular bbls.	36
In machine bbls.	36	36 1/2

Glue—			
Low Grade.....	7	8	10
Cabinet.....	12	12	14
Medium White.....	13	13	15
Extra White.....	17	17	20
French.....	10	10	20
English.....	10	10	15
Irish.....	19	19	

**I BEAT THE WORLD!** ALL INSIDE PARTS COATED WITH PURE BLOCK TIN

Cedar Tubs Extra Strong  
 Freeze Quickest and Run the Easiest  
 Have More New Improvements Than Other Freezers

**Shepard's Lightning Freezers**  
 Shepard Hdw. Co. Sole Makers Buffalo N. Y.

Pacific Coast Representatives, CHAS. L. PIERCE & CO., 202 Market St., SAN FRANCISCO, CAL.  
 Canadian Representative, H. D. SIMMONS, 85 York St., TORONTO, ONT.



MARCH 15, 1893.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

Prices Paid in New York.			
Heavy Copper	...	...	10
Light and Tinned Copper	...	...	9
Heavy Brass	...	...	7
Light Brass	...	...	6
Lead	...	...	34
Lead	...	...	28
Zinc	...	...	14
No. 1 Pewter	...	...	7
No. 2 Pewter	...	...	6
Wrought Scrap Iron	gross ton	\$17.00	
Cast Scrap	gross ton	15.00	
Sheet Plate Scrap	gross ton	7.00	
Burnt Iron	gross ton	5.00	

---

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google<sup>TM</sup> books

<https://books.google.com>

